Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

TEST REPORT

SCOPE OF WORK
FCC TESTING–CP3504L

REPORT NUMBER
200810037SZN-004

ISSUE DATE	**[REVISED DATE]**
September 10, 2020	[----------]

PAGES
59

DOCUMENT CONTROL NUMBER
FCC ID 247_b

101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.

Tel: (86 755) 8601 6288
Fax: (86 755) 8601 6751
www.intertek.com

Total Quality. Assured.

TEST REPORT

Intertek Report No.: 200810037SZN-004

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

Application
For
Certification

FCC ID: R38YLCP3504L

Smartphone

Model: CP3504L

2.4GHz Wi-Fi Transceiver

Report No.: 200810037SZN-004

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-19]

Prepared and Checked by:

Leo Li
Project Engineer

Approved by:

Peter Kang
Senior Technical Supervisor
Date: September 10, 2020

MEASUREMENT/TECHNICAL REPORT

This report concerns (check one) Original Grant ___X___ Class II Change _____

Equipment Type: DTS - Part 15 Digital Transmission Systems (Wi-Fi transmitter portion)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No ___X___

If yes, defer until : _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes _____ No ___X___

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-01-19] Edition] provision.

Report prepared by:

Leo Li
Intertek Testing Services Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue,
Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.
Tel: (86 755) 8614 0743 Fax: (86 755) 8601 6661

Table of Contents

1.0 Summary of Test results

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Applicant Address: Building B, Boton Science Part Chaguang Road, Xili Town, Nanshan District Shenzhen, China

Model: CP3504L
FCC ID: R38YLCP3504L

TEST ITEM	REFERENCE	RESULTS
Max. Output power	15.247(b)(3)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(e)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d), 15.209, FCC 15.205	Pass
AC Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

2.0 General Description

2.1 Product Description

CP3504L is subscriber equipment in the GSM/UMTS/LTE system. The GSM frequency band includes GSM850 and DCS1800 and PCS1900. but only GSM850/1900 test data included in this report. The UMTS frequency band is band I and band II and band IV and band V, but only band II and Band IV and Band V test data included in this report. The LTE frequency band is Band I and Band II and band III band IV and band V and band VII and Band XII and Band XIII and Band XVII and Band XXVIII, but only Band II and band IV and band V and band VII and Band XII and Band XIII and Band XVII test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, LTE/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS, Bluetooth and Wi-Fi etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and USIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices. Bluetooth and Wi-Fi transmitters are share one antenna while they can`t transmit simultaneously. The EUT is powered by DC 3.8V by rechargeable battery and charged by AC 120V/60Hz. For more detailed features description, please refer to the user's manual.

Type of Modulation: BPSK, QPSK, 16QAM, 64QAM for OFDM; CCK, DQPSK, DBPSK for DSSS.
Antenna Type: Integral Antenna
Antenna Gain: 0.6dBi

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

2.2 Related Submittal(s) Grants

This is an application for certification of a transceiver for the Smartphone 2.4GHz WIFI function.
For the GSM/WCDMA/LTE mode was tested and demonstrated in report 200810037SZN-001.
For the BT 4.2 EDR mode was tested and demonstrated in report 200810037SZN-002.
For the BT 4.2 BLE mode was tested and demonstrated in report 200810037SZN-003.
For other functions were reported in the SDOC report: 200810037SZN-006.

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013) and KDB 558074 D01 v05r02. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

2.4 Test Facility

The Semi-anechoic chamber and shielded room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Longhua Branch** and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China. This test facility and site measurement data have been fully placed on file with File Number: CN1188.

3.0 System Test Configuration

3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The EUT is powered by DC 3.8V by rechargeable battery and charged by AC 120V/60Hz during the test, only the worst data was reported in this report.

For maximizing emissions, the EUT was rotated through 360°, the EUT was placed on the styrene turntable with 0.8m up to 1GHz and 1.5 m above 1GHz. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meters reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

The rear of unit was flushed with the rear of the table.

Radiated emission measurement was performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

3.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

The parameters of test software setting:
During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the application and is going to be fixed on the firmware of the end product.

Test software: Nonsignaling operation platform

3.3 Special Accessories

USB cable (Shielded, Length 75cm)

3.4 Equipment Modification

Any modifications installed previous to testing by Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Longhua Branch.

3.5 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

3.6 Support Equipment List and Description

Description	Manufacturer	Remark
Power Adapter	SHENZHEN TIANYIN ELECTRONICS CO., LTD	Model: TPA-46050200UU Input: 100-240V~, 50/60Hz, 0.3A Output: DC 5V, 2000mA
USB cable	Provided by applicant	Shielded, Length: 75cm

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: August 21, 2020 Model: CP3504L

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna power of the EUT was connected to the input of a broadband peak RF power meter. The power meter has a video bandwidth that is greater than DTS bandwidth and utilize a fast-responding diode detector. Power was read directly at the EUT antenna terminals with cable loss added.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

IEEE 802.11b (Antenna Gain = 0.6dBi) (CCK, 1Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2412	15.6	36.3
Middle Channel: 2437	17.0	50.1
High Channel: 2462	16.5	44.7

IEEE 802.11g (Antenna Gain = 0.6dBi) (16QAM, 6Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2412	18.9	77.6
Middle Channel: 2437	19.1	81.3
High Channel: 2462	20.1	102.3

IEEE 802.11n-HT20 (Antenna Gain = 0.6dBi) (16QAM, 6.5Mbps)		
Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 2412	18.3	67.6
Middle Channel: 2437	18.9	77.6
High Channel: 2462	19.4	87.1

Cable loss: 0.5 dB External Attenuation: 0 dB
Cable loss, external attenuation has been included in OFFSET function

EUT max. output level = 20.1dBm
EUT max. radiated output level = 20.1dBm + 0.6dBi = 20.7dBm

For RF Exposure, the information is saved with filename: RF exposure.pdf.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: August 21, 2020 Model: CP3504L

4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a) (2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 KHz according to FCC KDB 558074 D01 v05r02. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

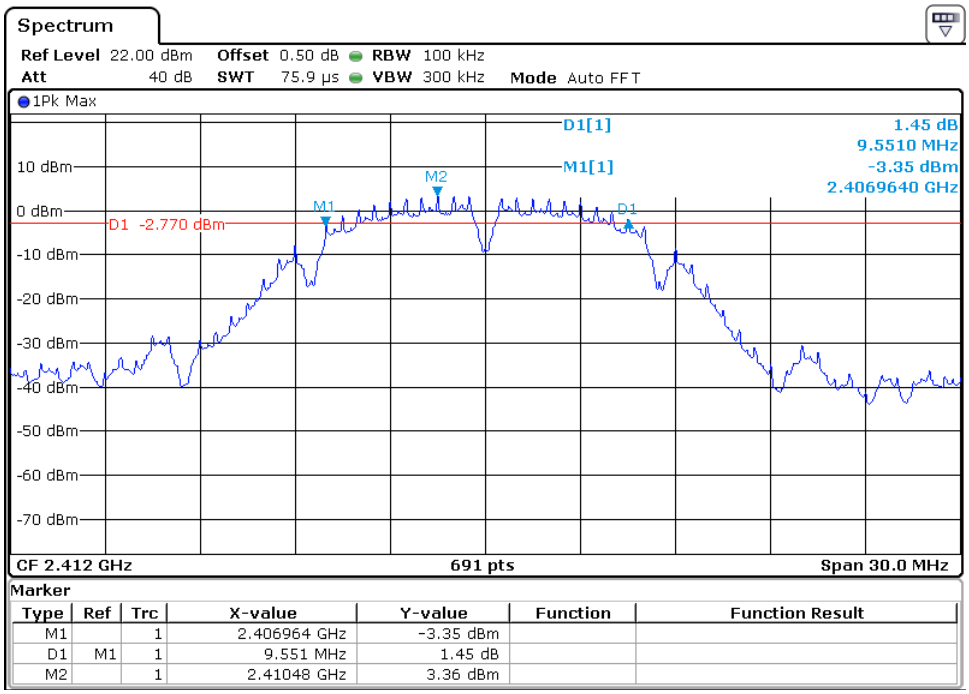
IEEE 802.11b (CCK, 1Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	9.551
2437	9.551
2462	9.551

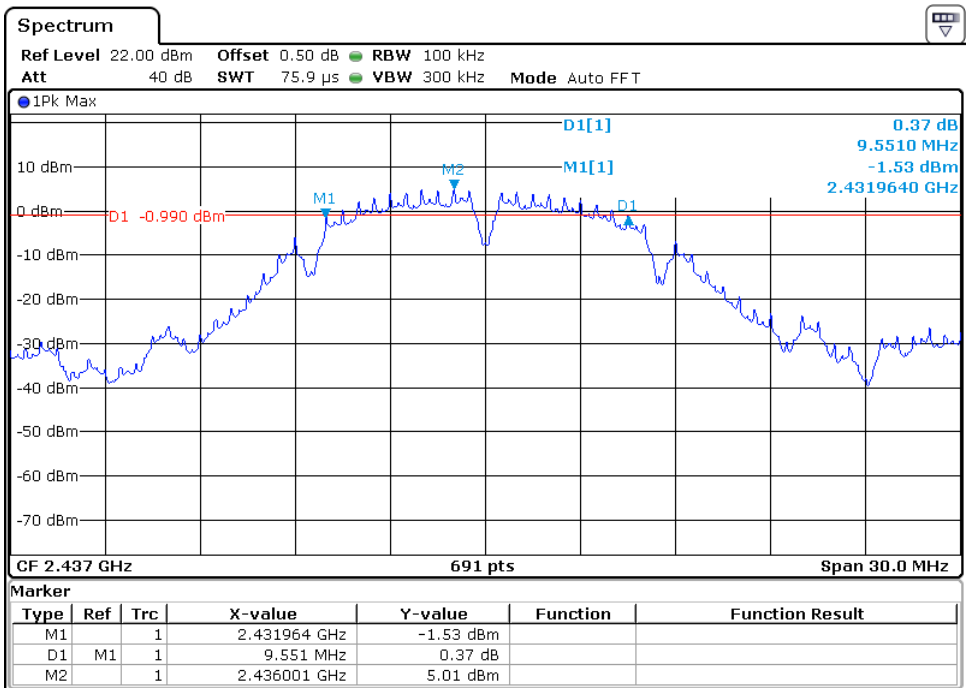
IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	16.454
2437	16.454
2462	16.107

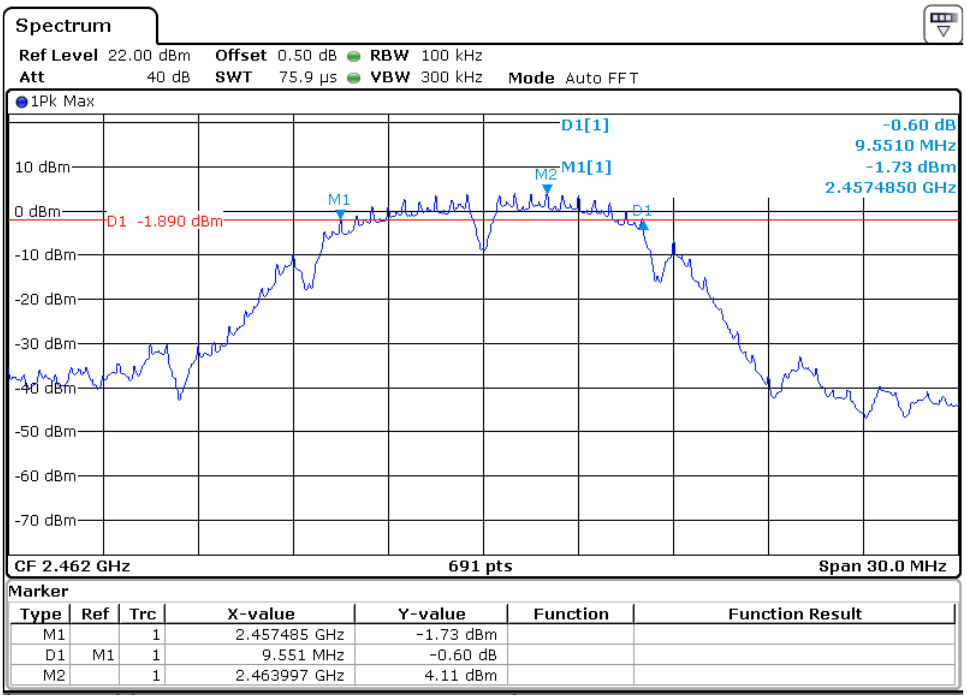
IEEE 802.11n-HT20 (64QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	17.670
2437	17.323
2462	17.453

The test plots are attached as below.

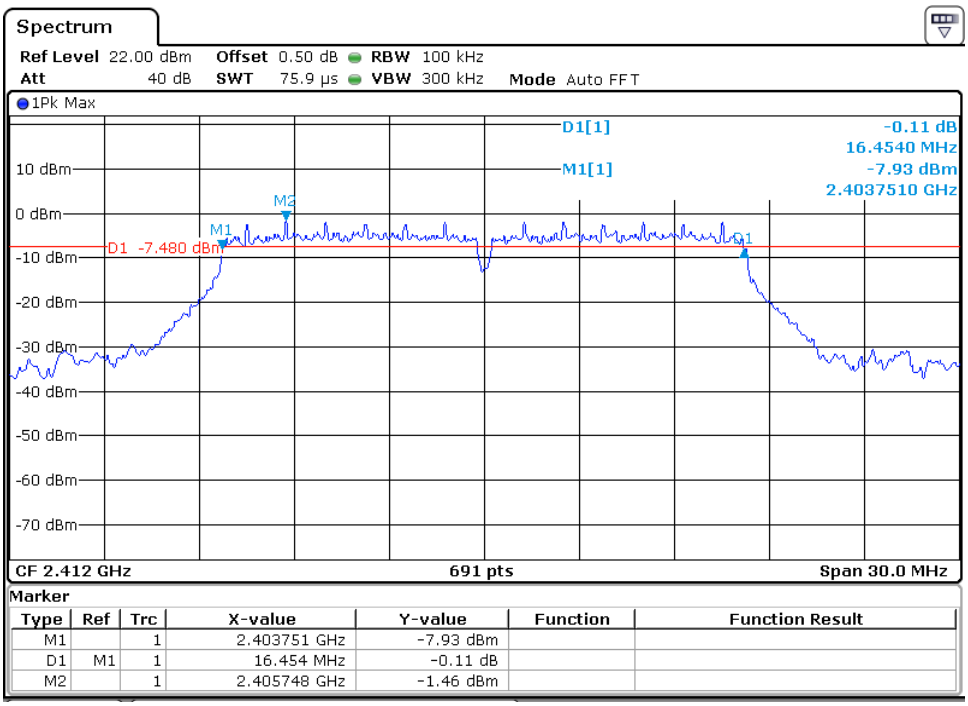
802.11b

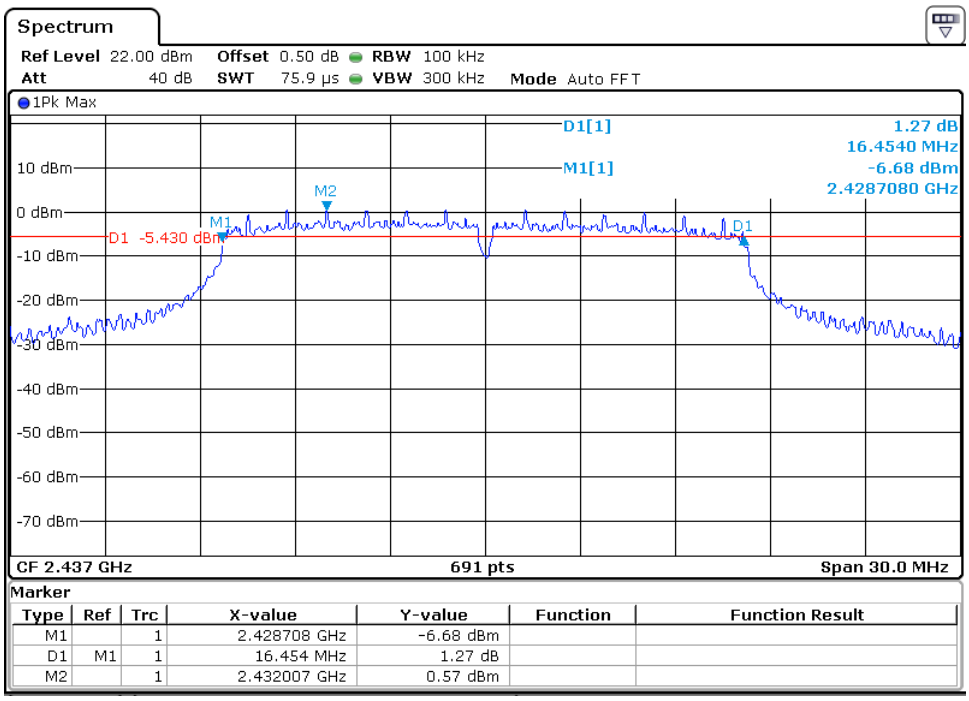

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 1.45 dB
9.5510 MHz
M1[1] -3.35 dBm
2.4069640 GHz
D1 -2.770 dBm
CF 2.412 GHz
691 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.406964 GHz -3.35 dBm
D1 M1 1 9.551 MHz 1.45 dB
M2 1 2.41048 GHz 3.36 dBm

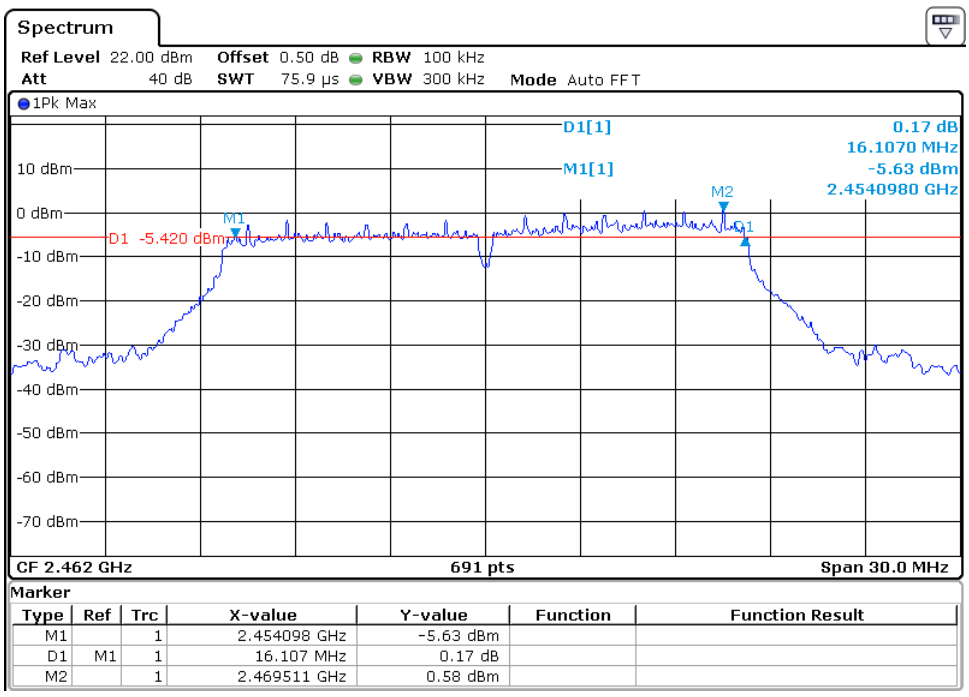

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 0.37 dB
9.5510 MHz
M1[1] -1.53 dBm
2.4319640 GHz
D1 -0.990 dBm
CF 2.437 GHz
691 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.431964 GHz -1.53 dBm
D1 M1 1 9.551 MHz 0.37 dB
M2 1 2.436001 GHz 5.01 dBm


Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.60 dB
9.5510 MHz
M1[1] -1.73 dBm
2.4574850 GHz
D1 -1.890 dBm
CF 2.462 GHz
691 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.457485 GHz -1.73 dBm
D1 M1 1 9.551 MHz -0.60 dB
M2 1 2.463997 GHz 4.11 dBm

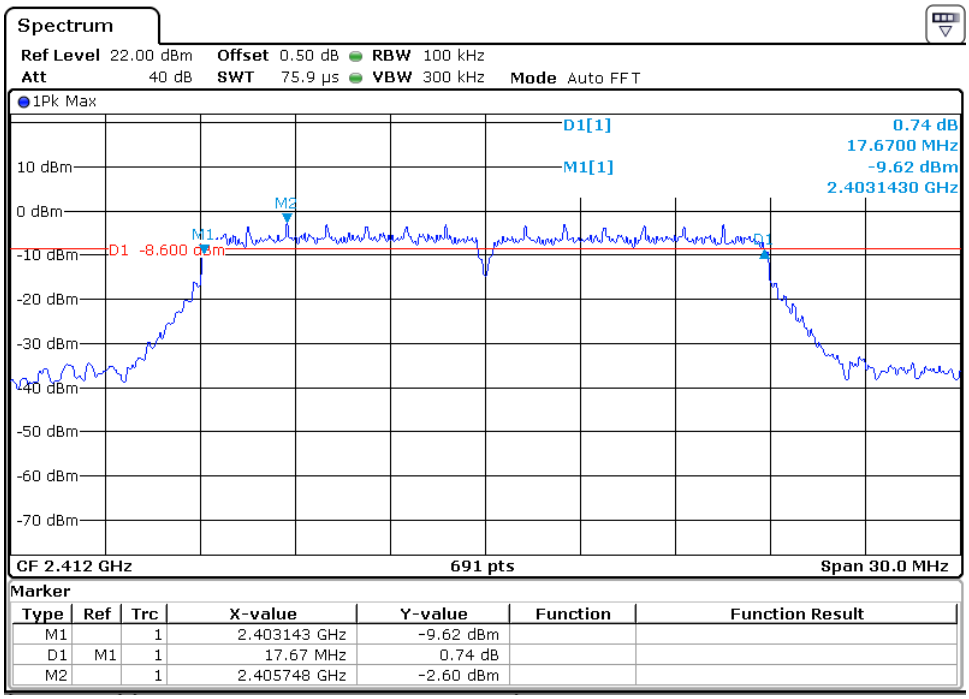
802.11g

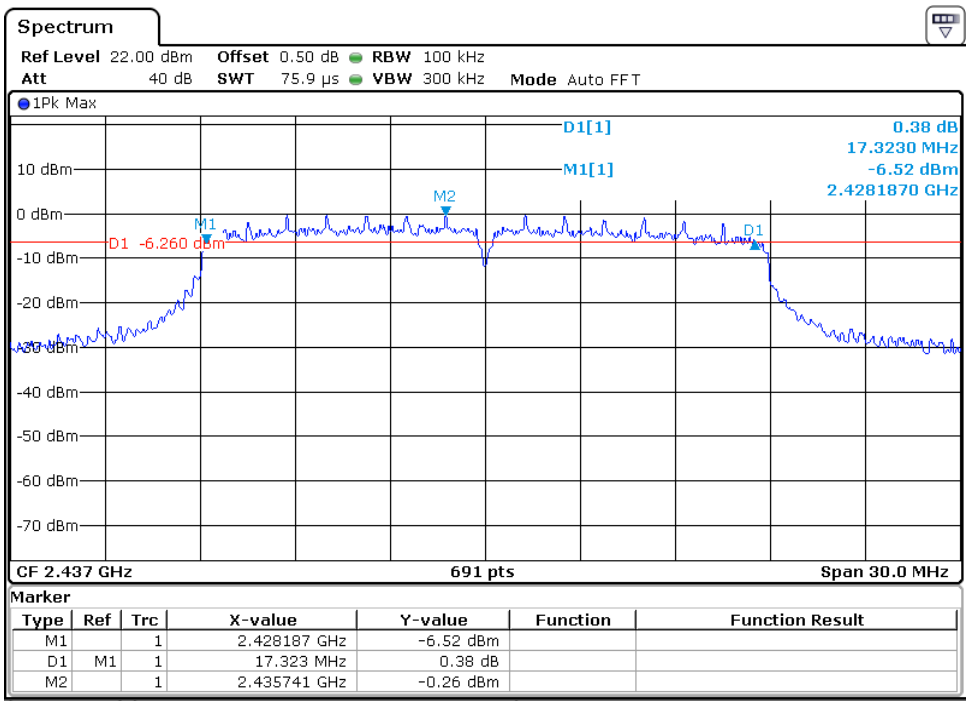

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.11 dB
16.4540 MHz
M1[1] -7.93 dBm
2.4037510 GHz
D1 -7.480 dBm
CF 2.412 GHz
691 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.403751 GHz -7.93 dBm
D1 M1 1 16.454 MHz -0.11 dB
M2 1 2.405748 GHz -1.46 dBm

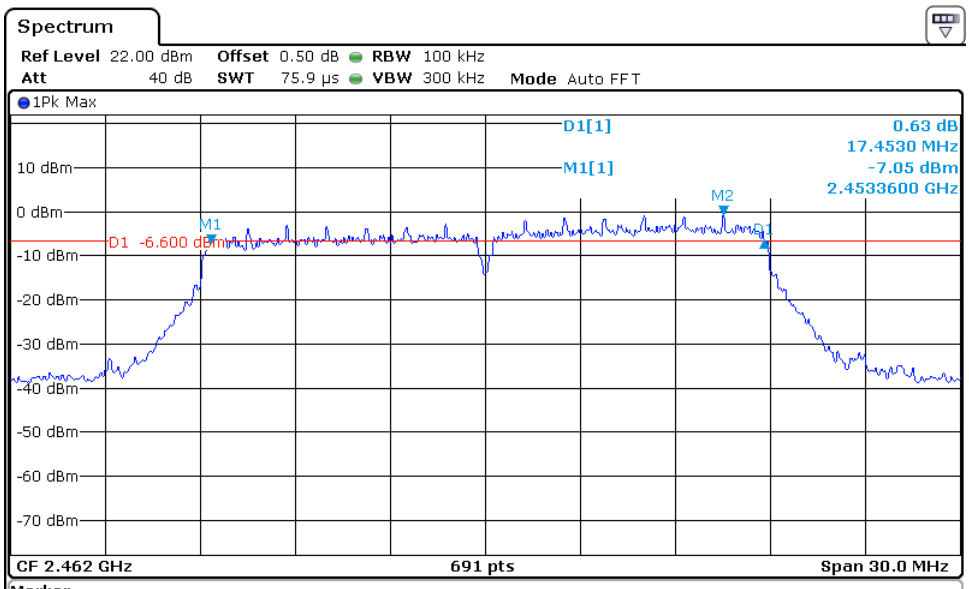

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 1.27 dB
16.4540 MHz
M1[1] -6.68 dBm
2.4287080 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
M2
D1
D1 -5.430 dBm
CF 2.437 GHz
691 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.428708 GHz -6.68 dBm
D1 M1 1 16.454 MHz 1.27 dB
M2 1 2.432007 GHz 0.57 dBm


Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 0.17 dB
16.1070 MHz
M1[1] -5.63 dBm
2.4540980 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
M2
D1
D1 -5.420 dBm
CF 2.462 GHz
691 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.454098 GHz -5.63 dBm
D1 M1 1 16.107 MHz 0.17 dB
M2 1 2.469511 GHz 0.58 dBm

802.11n-HT20


Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 0.74 dB
17.6700 MHz
M1[1] -9.62 dBm
2.4031430 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
M2
D1 -8.600 dBm
D1
CF 2.412 GHz
691 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.403143 GHz -9.62 dBm
D1 M1 1 17.67 MHz 0.74 dB
M2 1 2.405748 GHz -2.60 dBm


Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 0.38 dB
17.3230 MHz
M1[1] -6.52 dBm
2.4281870 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
M2
D1 -6.260 dBm
D1
CF 2.437 GHz
691 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.428187 GHz -6.52 dBm
D1 M1 1 17.323 MHz 0.38 dB
M2 1 2.435741 GHz -0.26 dBm



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45336 GHz	-7.05 dBm		
D1	M1	1	17.453 MHz	0.63 dB		
M2		1	2.469511 GHz	-0.60 dBm		

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: August 21, 2020 Model: CP3504L

4.3 Maximum Power Density Reading, FCC Rule 15.247(e):

The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 v05r02.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 8dBm/3 kHz.

IEEE 802.11b (CCK, 1Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2412	3.12
2437	4.94
2462	4.06

IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	Power Density with RBW 3KHz
2412	-1.42
2437	0.57
2462	0.61

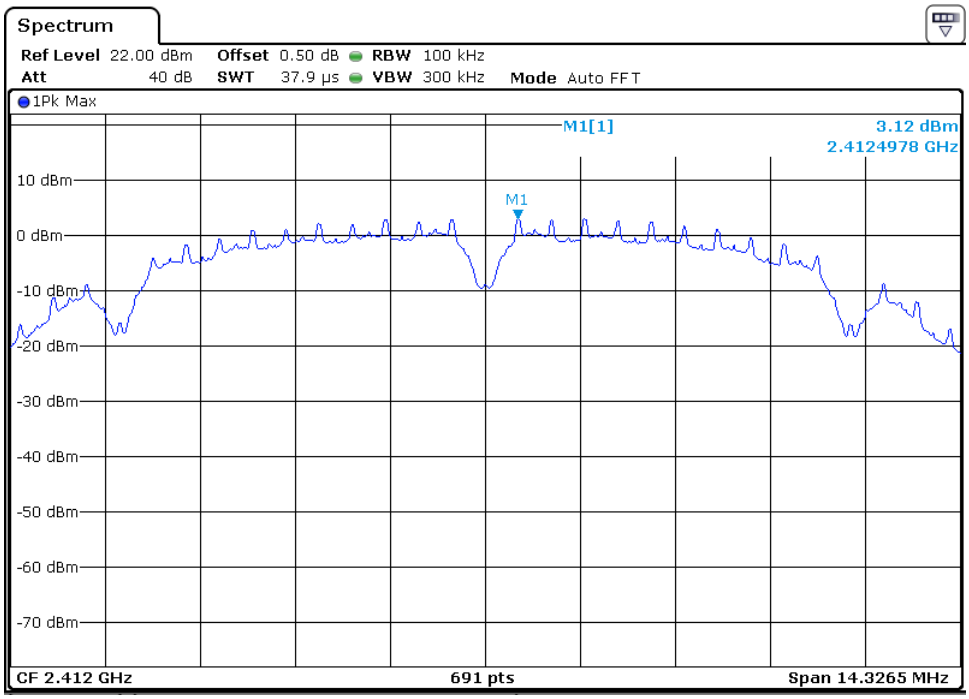
IEEE 802.11n-HT20 (16QAM, 6.5Mbps)	
Frequency (MHz)	Power Density with RBW 3KHz
2412	-2.65
2437	-0.34
2462	-0.54

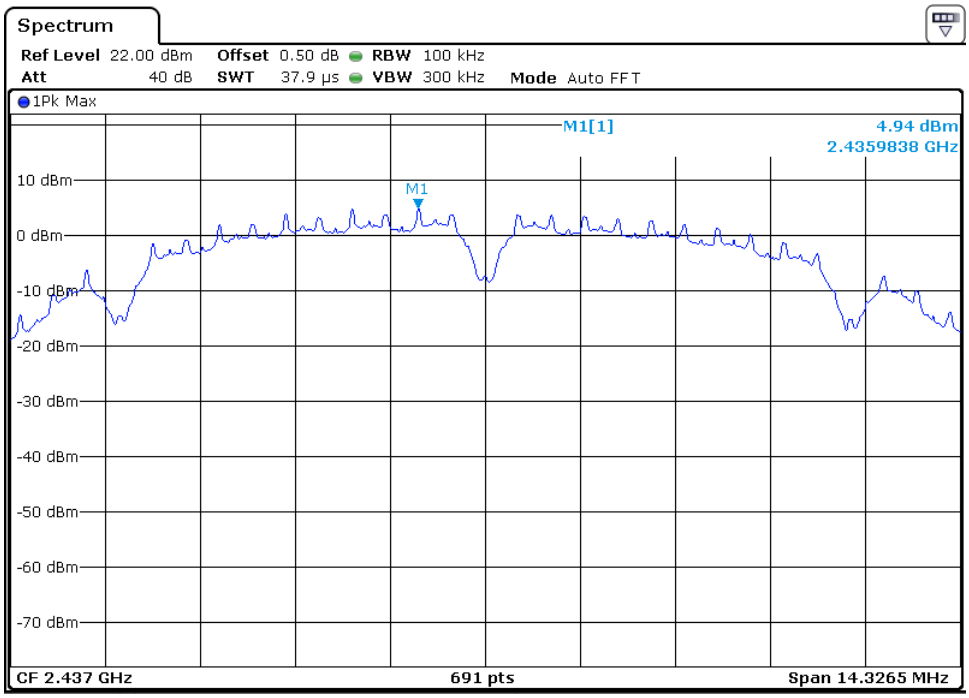
Cable loss: 0.5 dB External Attenuation: 0 dB

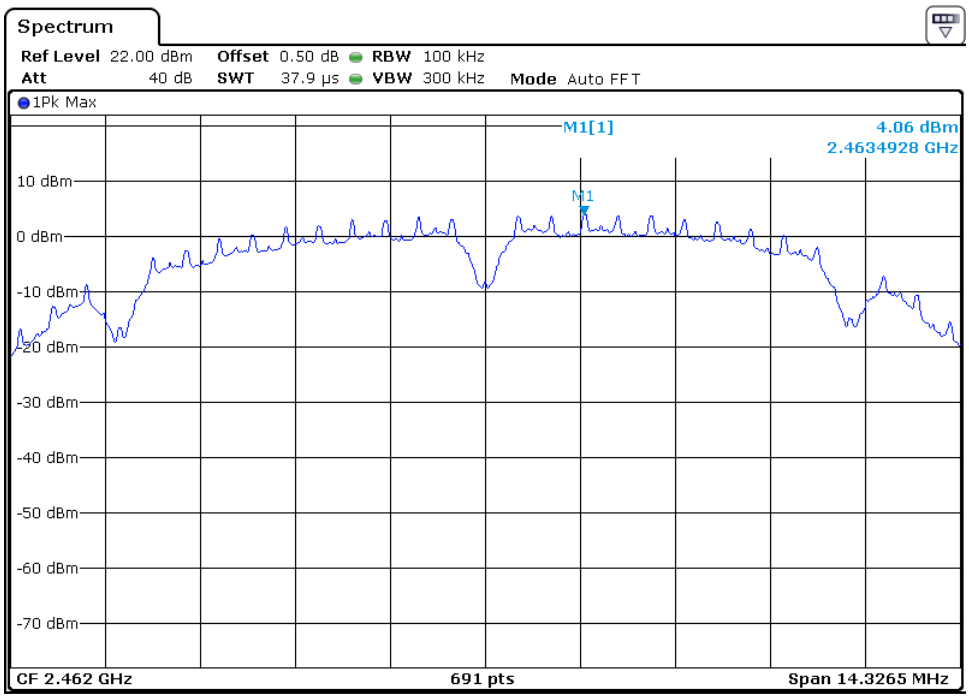
Cable loss, external attenuation has been included in OFFSET function

The test plots are attached as below.

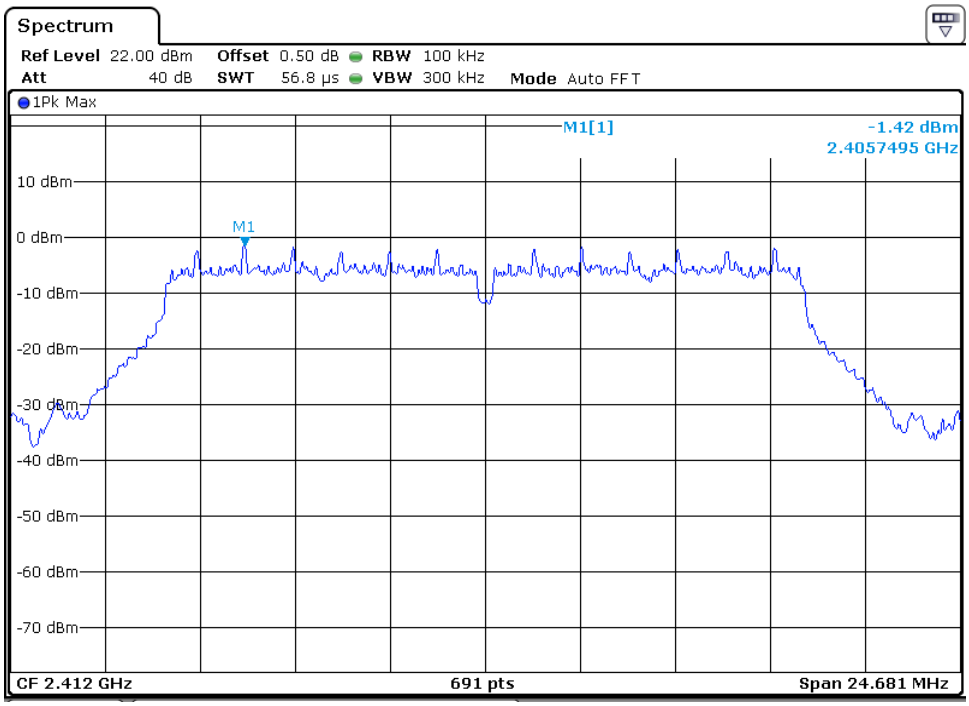
802.11b

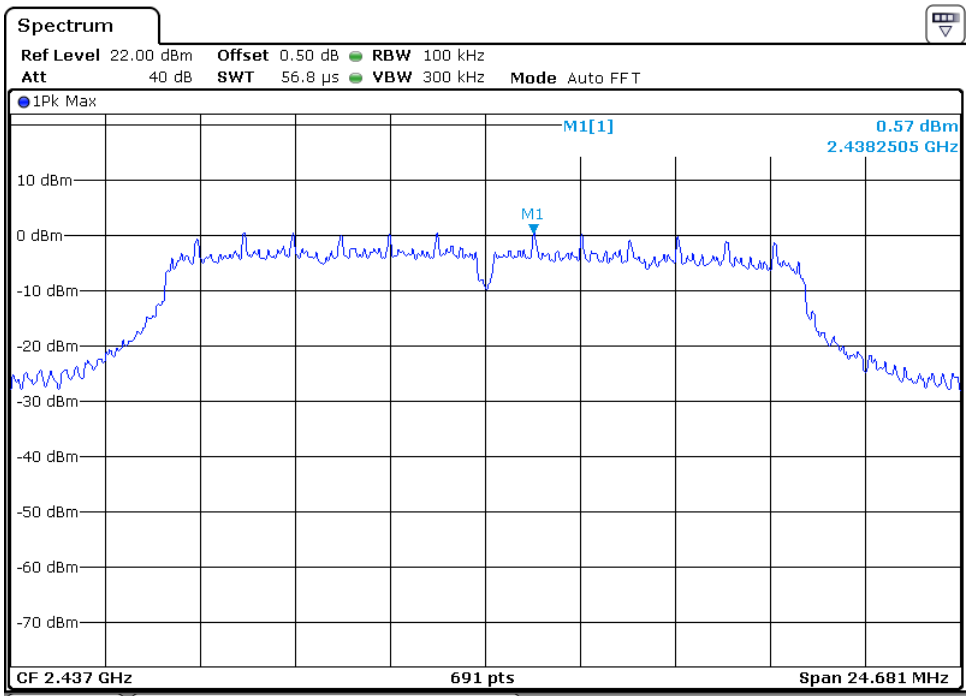

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] 3.12 dBm
2.4124978 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.412 GHz
691 pts
Span 14.3265 MHz

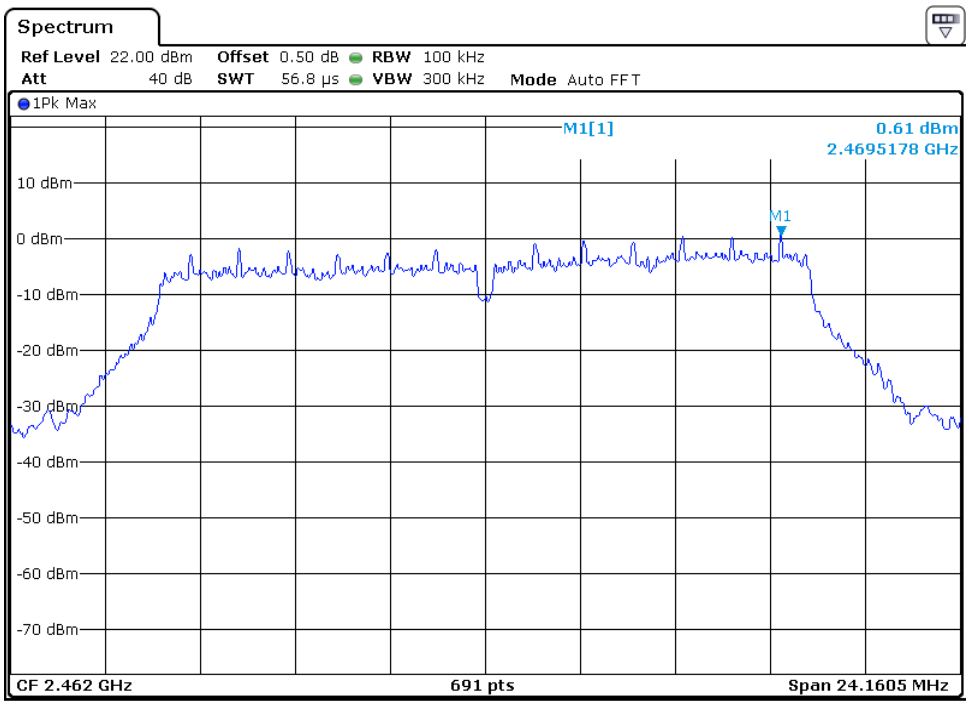

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] 4.94 dBm
2.4359838 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.437 GHz
691 pts
Span 14.3265 MHz


Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] 4.06 dBm
2.4634928 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.462 GHz
691 pts
Span 14.3265 MHz

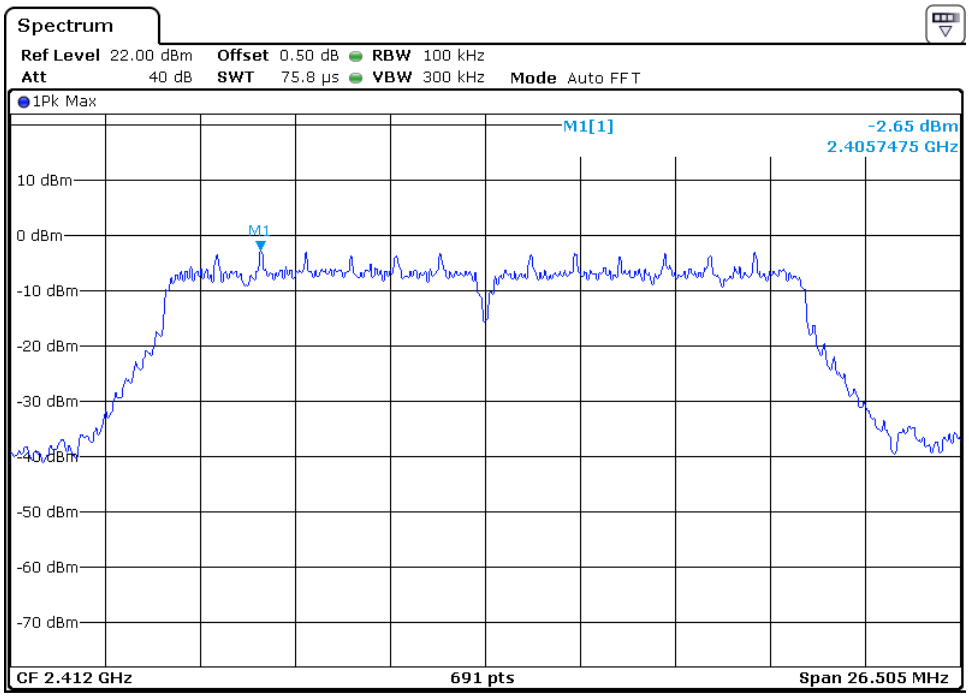
802.11g

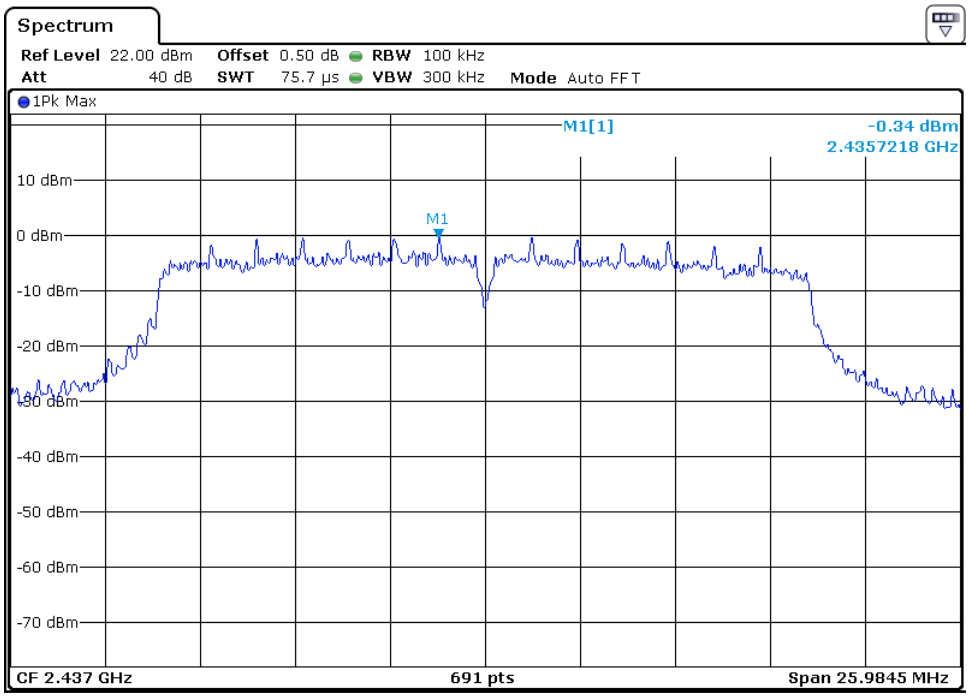

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 56.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] -1.42 dBm
2.4057495 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.412 GHz
691 pts
Span 24.681 MHz

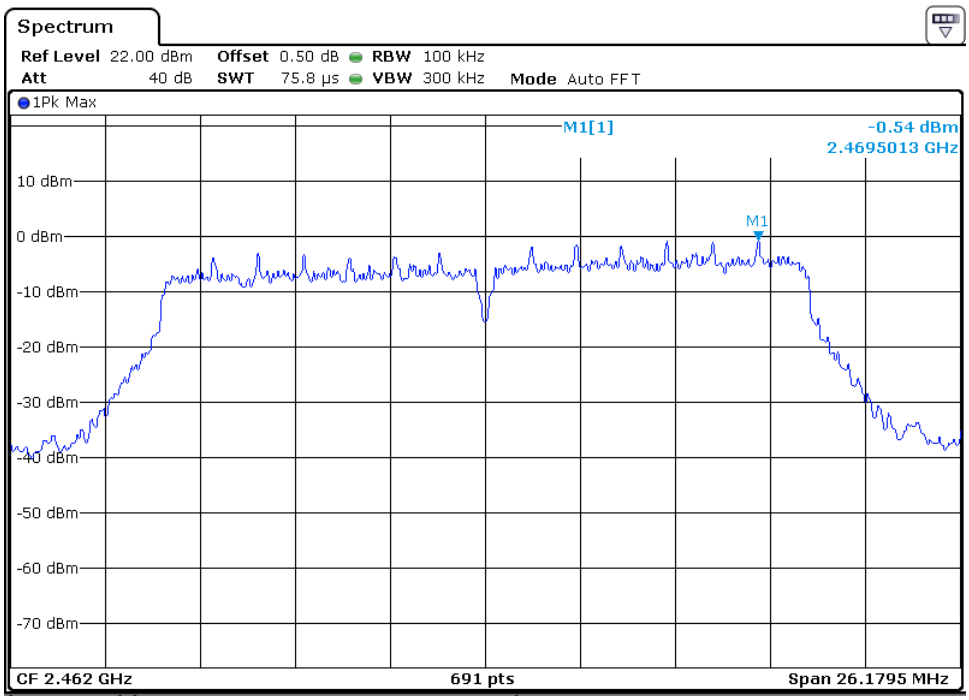

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 56.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] 0.57 dBm
2.4382505 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.437 GHz
691 pts
Span 24.681 MHz


Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 56.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] 0.61 dBm
2.4695178 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.462 GHz
691 pts
Span 24.1605 MHz

802.11n-HT20


Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] -2.65 dBm
2.4057475 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.412 GHz
691 pts
Span 26.505 MHz


Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.7 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] -0.34 dBm
2.4357218 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.437 GHz
691 pts
Span 25.9845 MHz


Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1]
-0.54 dBm
2.4695013 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.462 GHz
691 pts
Span 26.1795 MHz

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: August 21, 2020 Model: CP3504L

4.4 Out of Band Conducted Emissions, FCC Rule 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. The Measurement Procedure was set according to the FCC KDB 558074 D01 v05r02.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

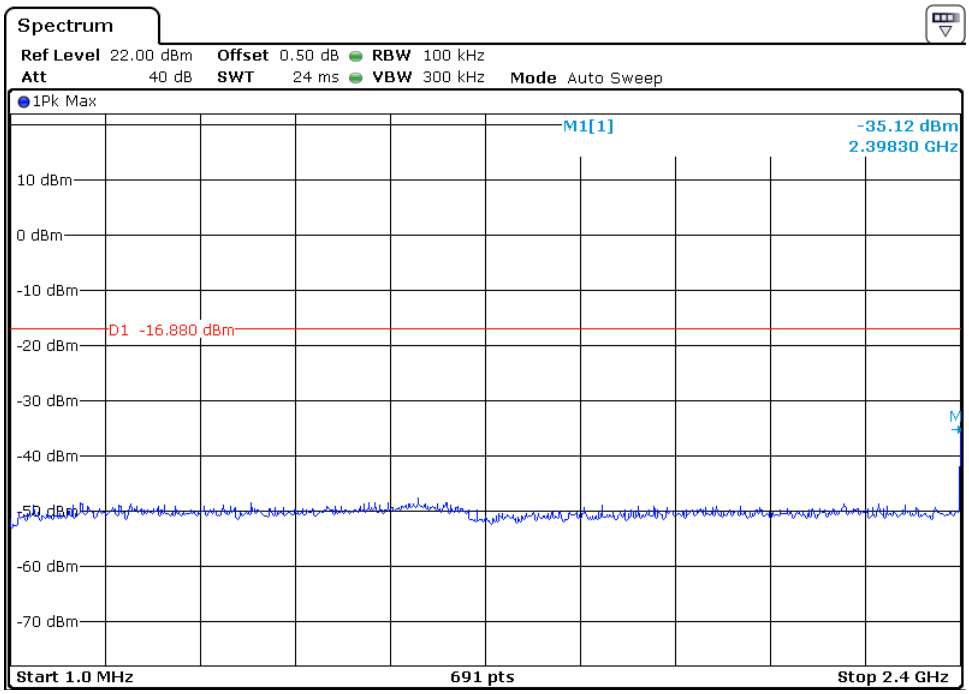
Refer to the attached test plots for out of band conducted emissions data with rate of 1Mbps for 802.11b and 6Mbps for 802.11g and 6Mbps for 802.11n-HT20.

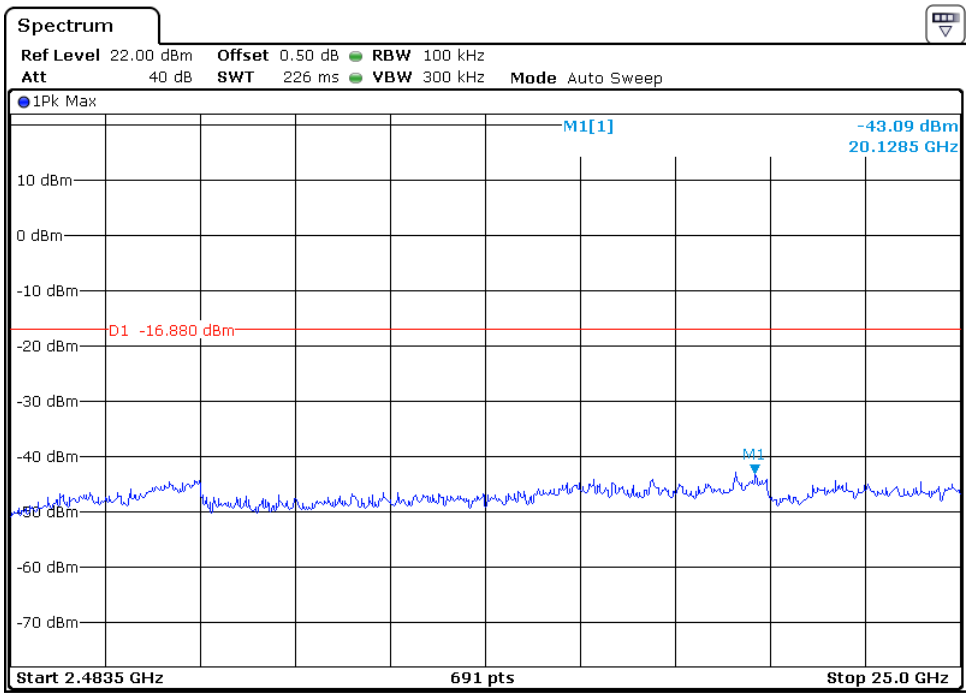
The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

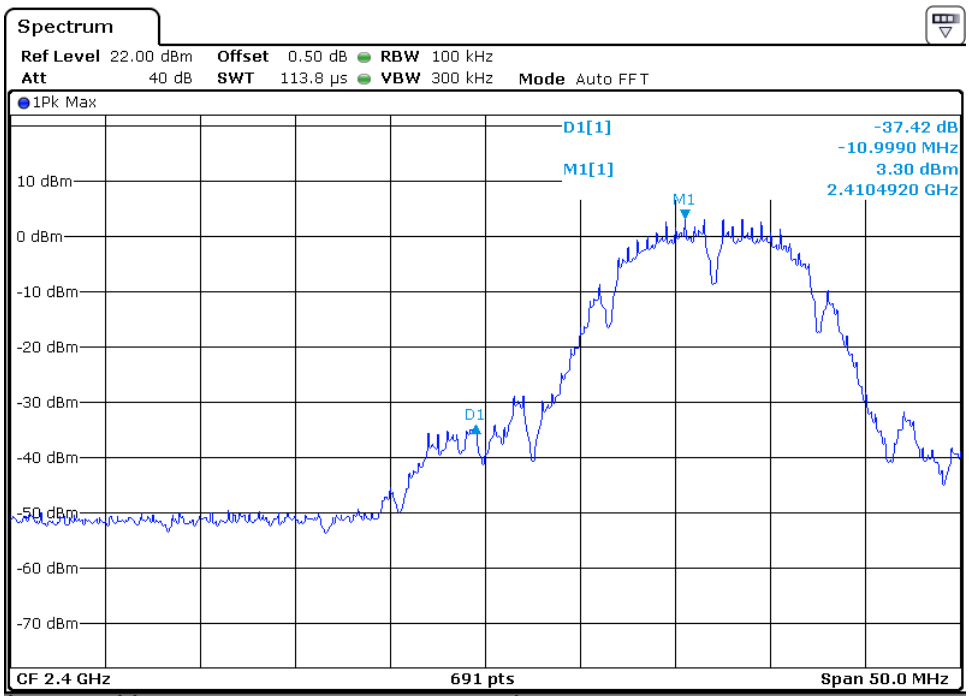
The test plots are attached as below.

SISO Mode, Ant1:

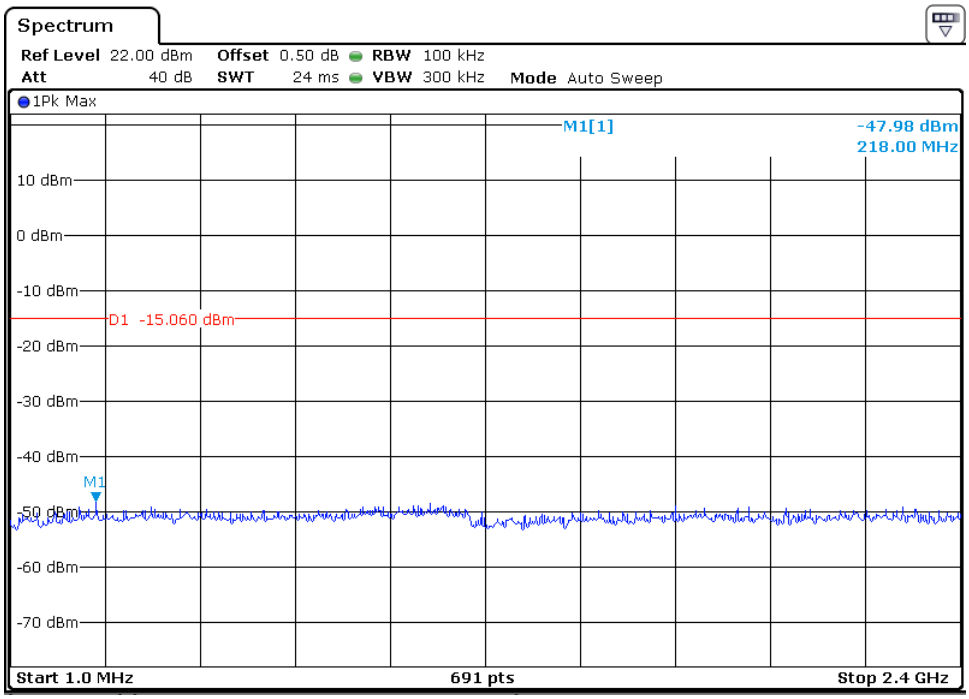
802.11b
Channel 01 (2412MHz) Reference Level: 3.12dBm

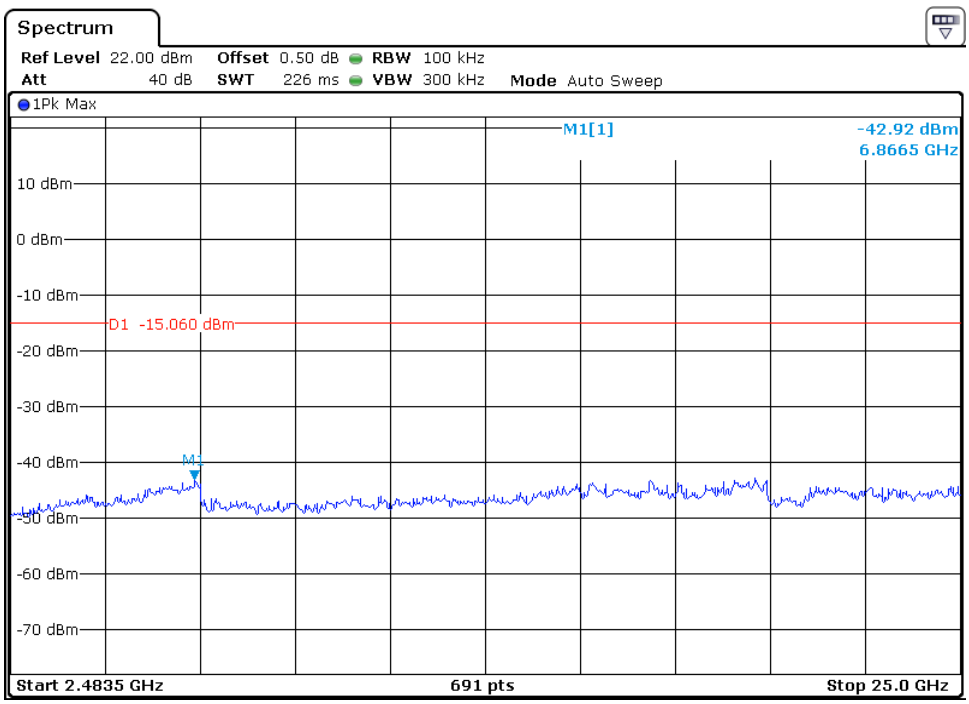




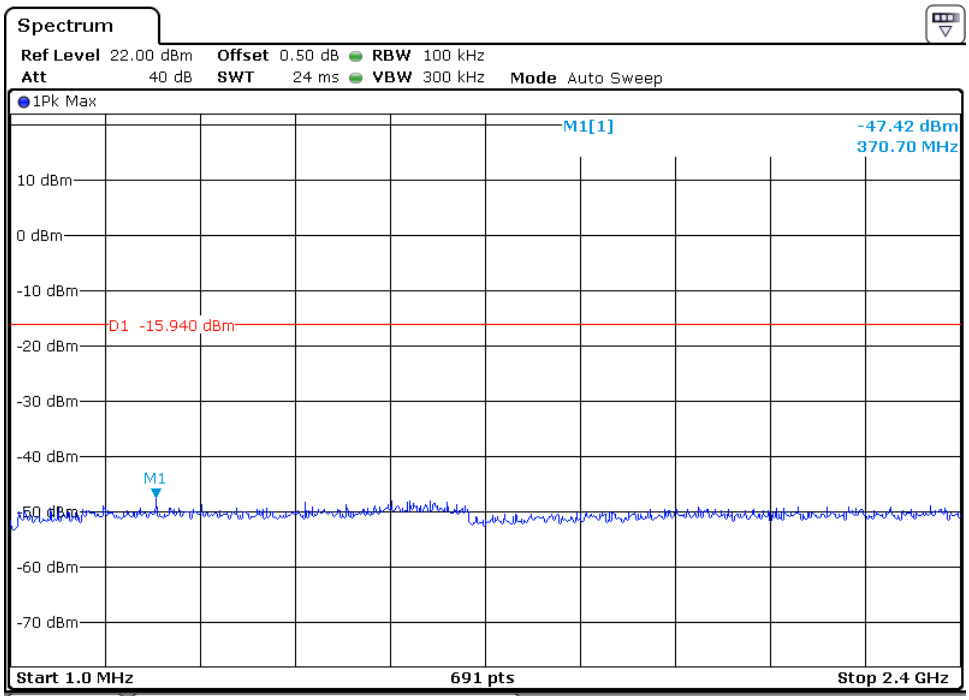

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 113.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -37.42 dB
-10.9990 MHz
M1[1] 3.30 dBm
2.4104920 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
D1
CF 2.4 GHz
691 pts
Span 50.0 MHz

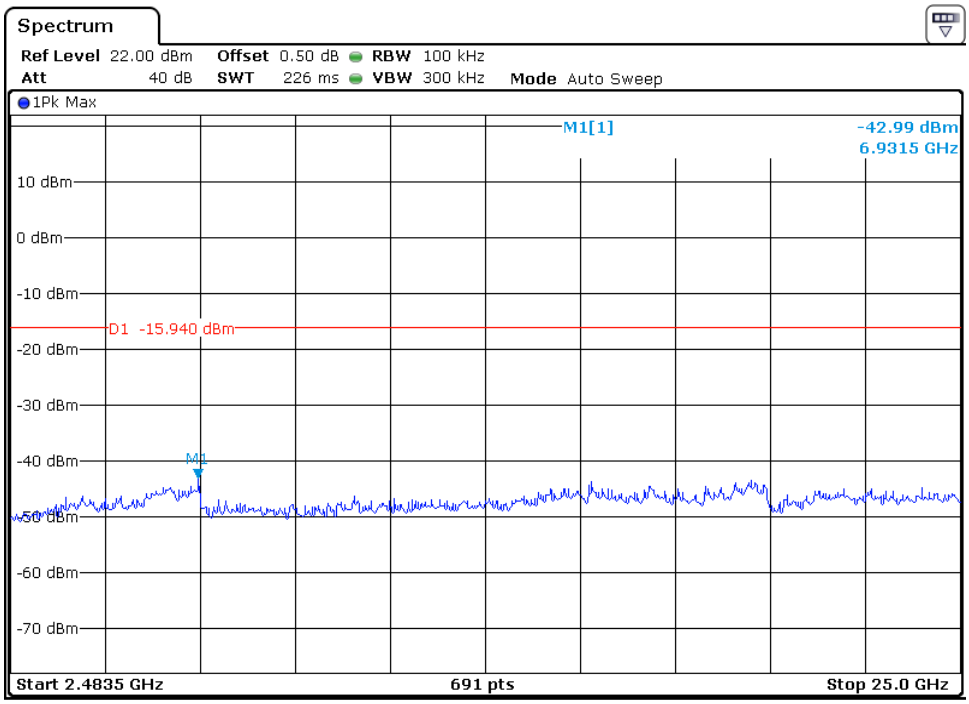
Channel 06 (2437MHz) Reference Level: 4.94dBm

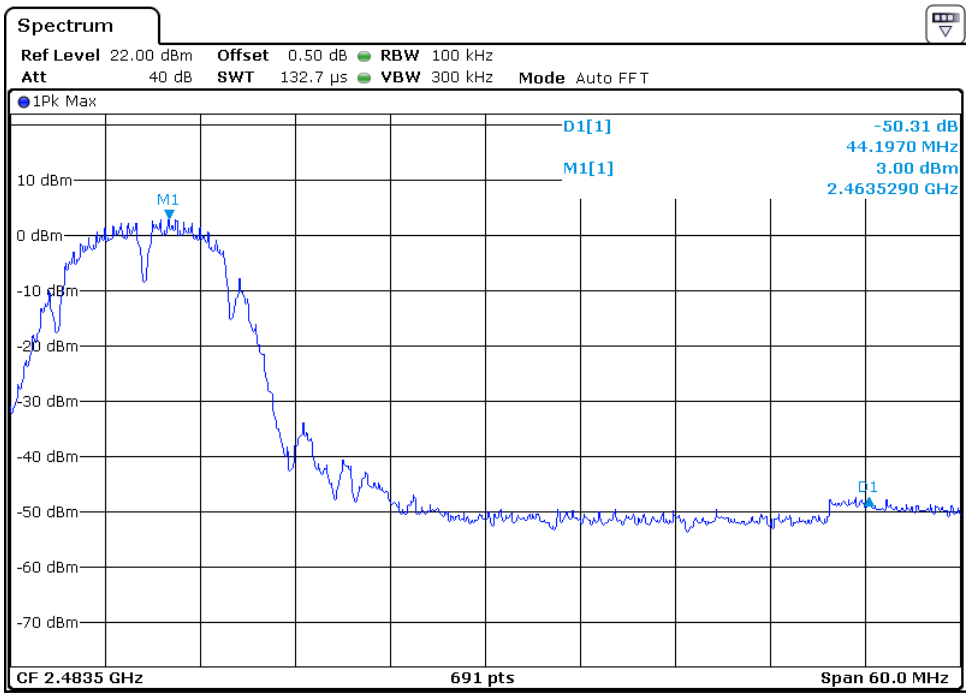




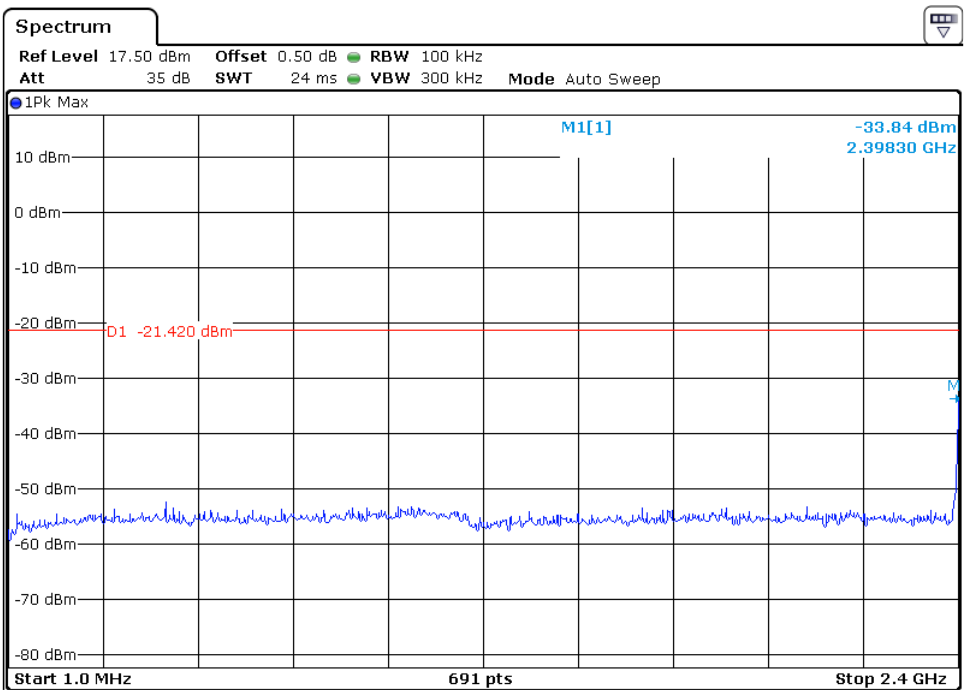
Channel 11 (2462MHz) Reference Level: 4.06dBm

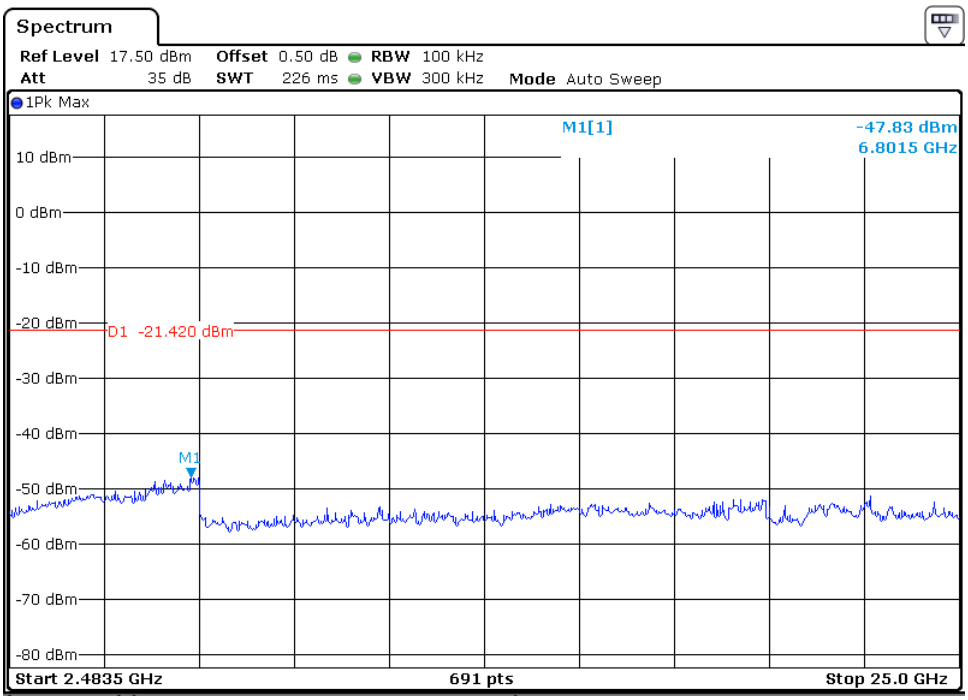


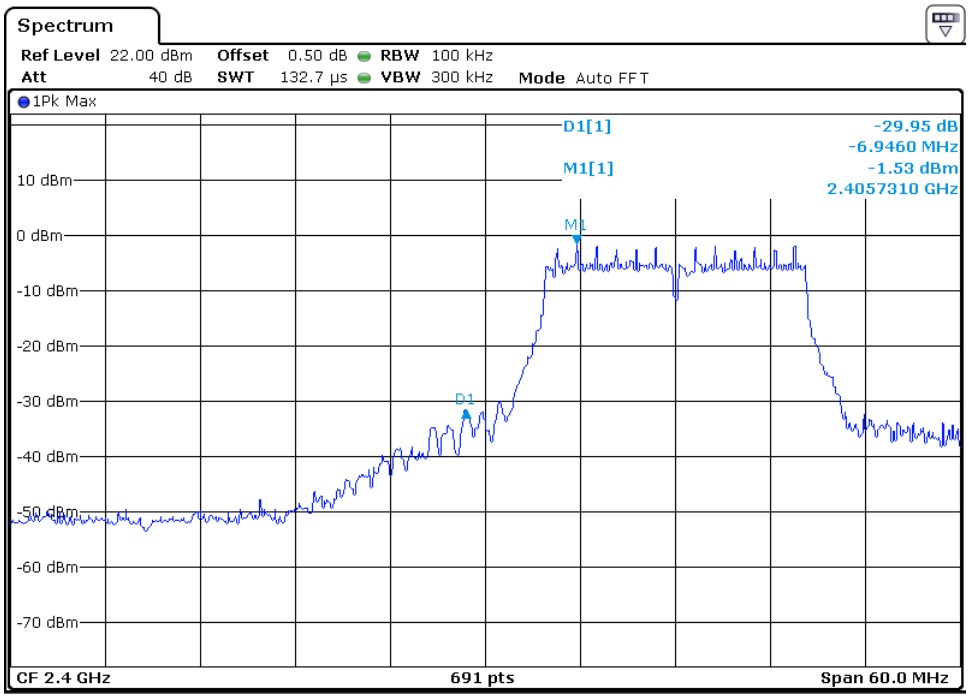



Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 132.7 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -50.31 dB
44.1970 MHz
M1[1] 3.00 dBm
2.4635290 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
D1
CF 2.4835 GHz
691 pts
Span 60.0 MHz

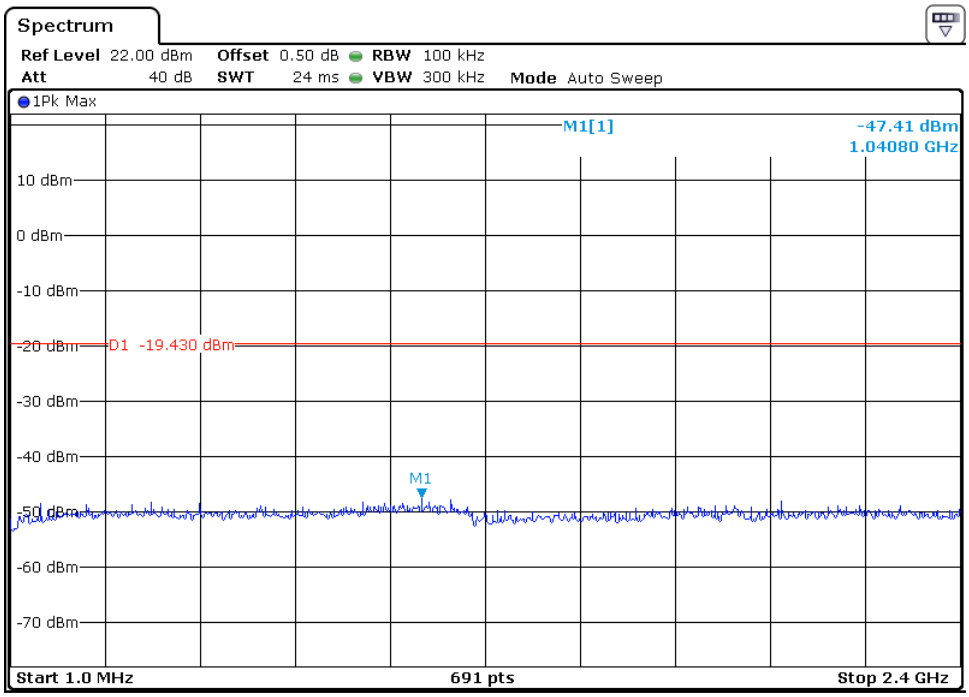
802.11g
Channel 01 (2412MHz) Reference Level: -1.42dBm

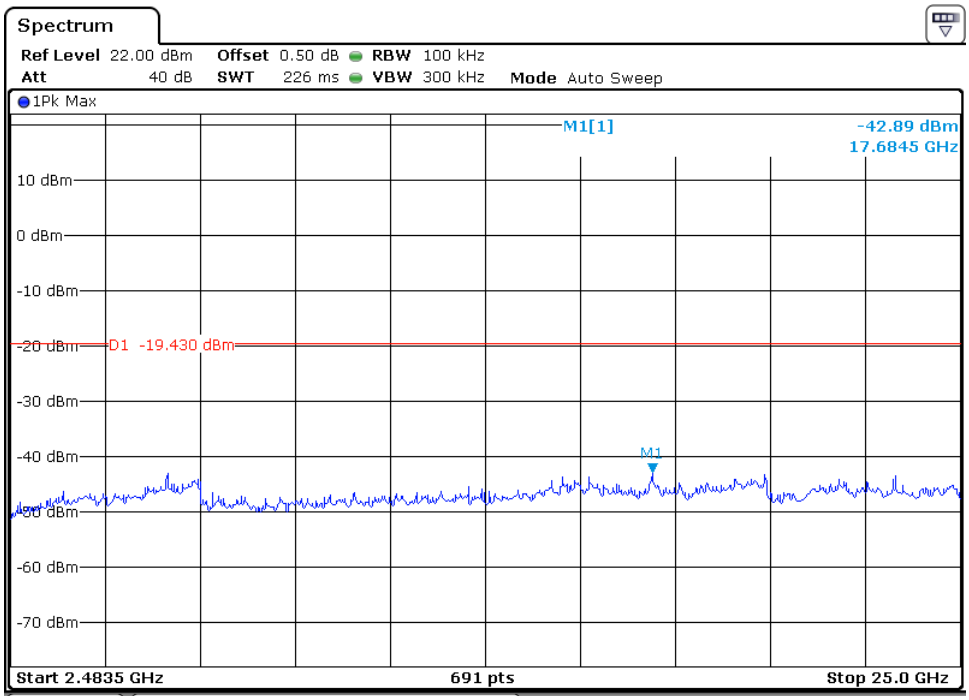




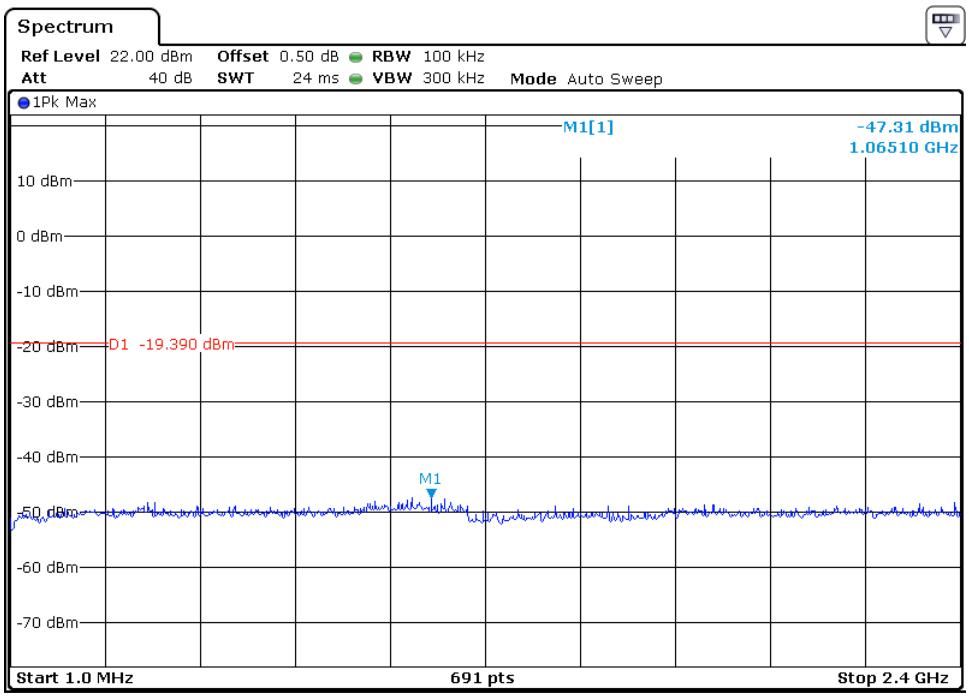

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 132.7 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1]
-29.95 dB
-6.9460 MHz
M1[1]
-1.53 dBm
2.4057310 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
D1
CF 2.4 GHz
691 pts
Span 60.0 MHz

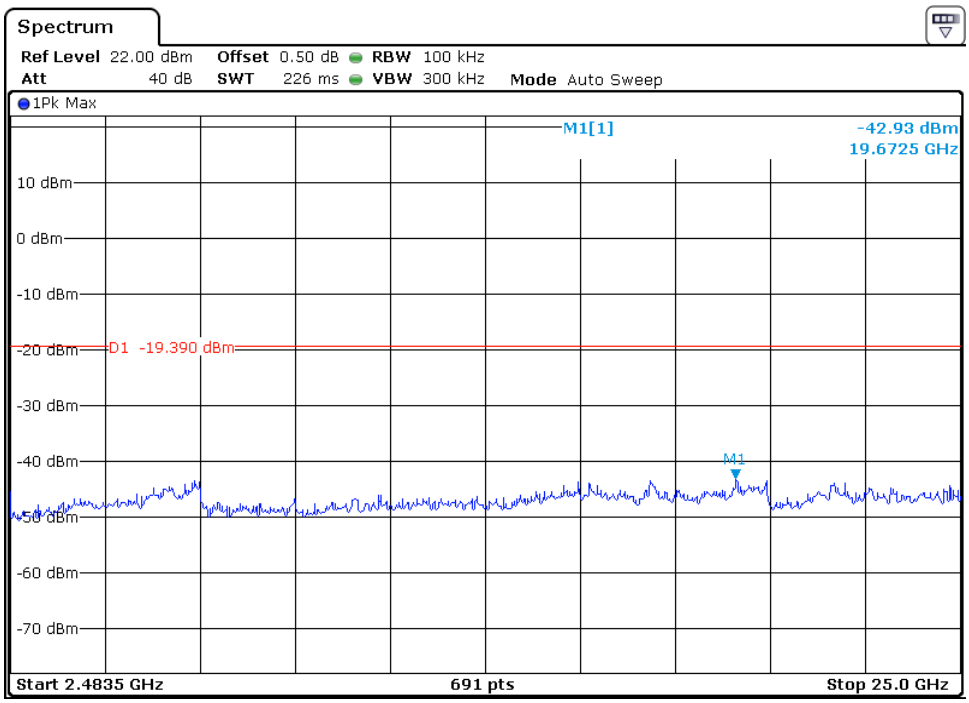
Channel 06 (2437MHz) Reference Level: 0.57dBm

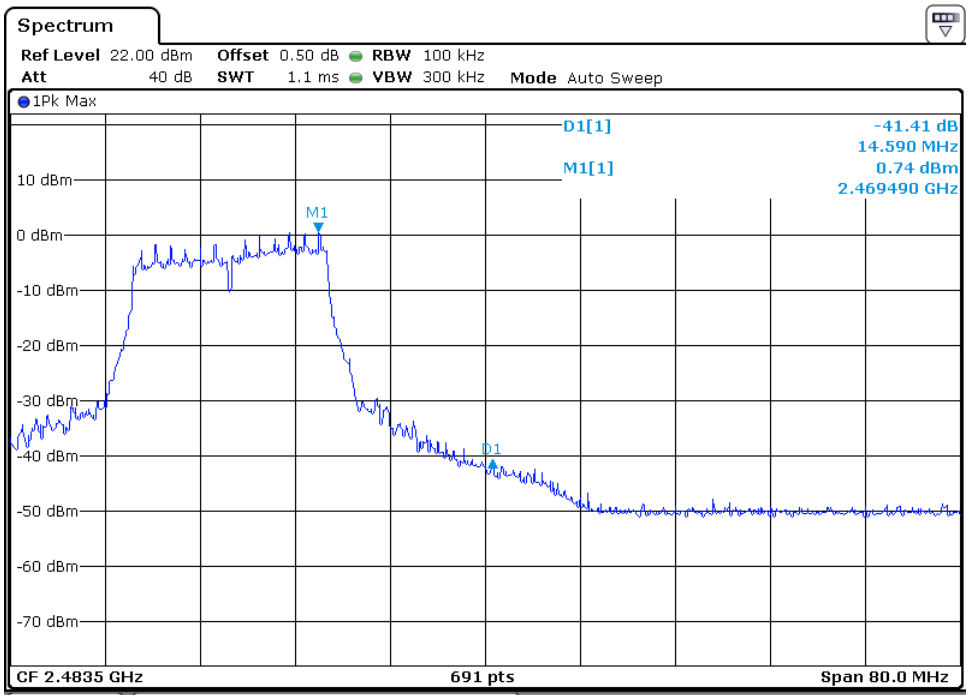




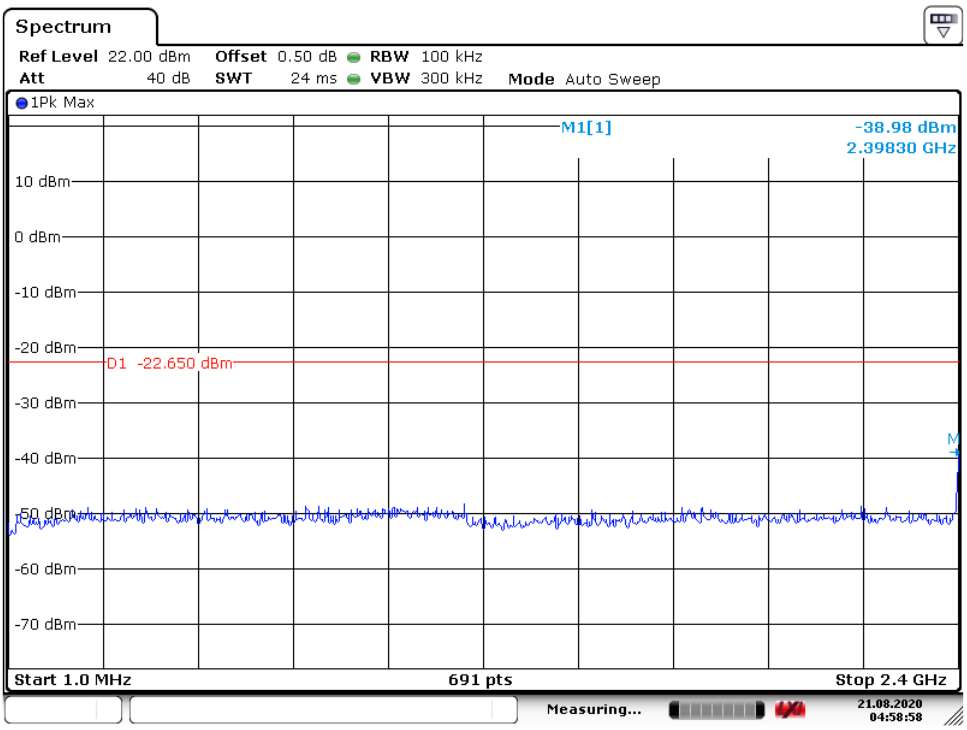
Channel 11 (2462MHz) Reference Level: 0.61dBm

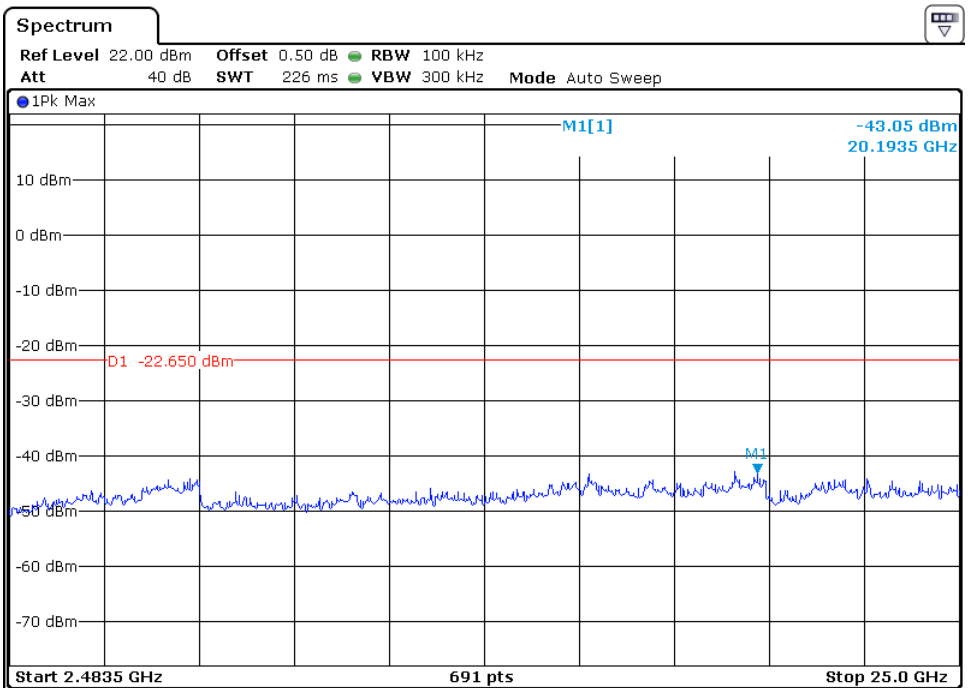

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 24 ms VBW 300 kHz Mode Auto Sweep
1Pk Max
M1[1] -47.31 dBm
1.06510 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
D1 -19.390 dBm
-30 dBm
-40 dBm
M1
-50 dBm
-60 dBm
-70 dBm
Start 1.0 MHz
691 pts
Stop 2.4 GHz

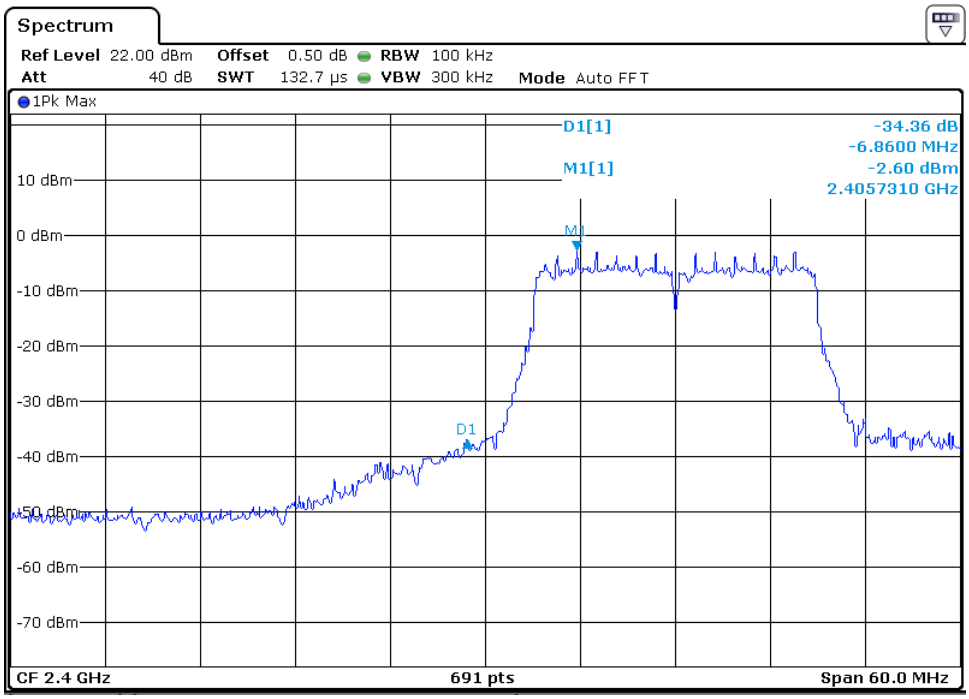

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 226 ms VBW 300 kHz Mode Auto Sweep
1Pk Max
M1[1] -42.93 dBm
19.6725 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
D1 -19.390 dBm
-30 dBm
-40 dBm
M1
-50 dBm
-60 dBm
-70 dBm
Start 2.4835 GHz
691 pts
Stop 25.0 GHz


Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep
1Pk Max
D1[1] -41.41 dB
14.590 MHz
M1[1] 0.74 dBm
2.469490 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
D1
CF 2.4835 GHz
691 pts
Span 80.0 MHz

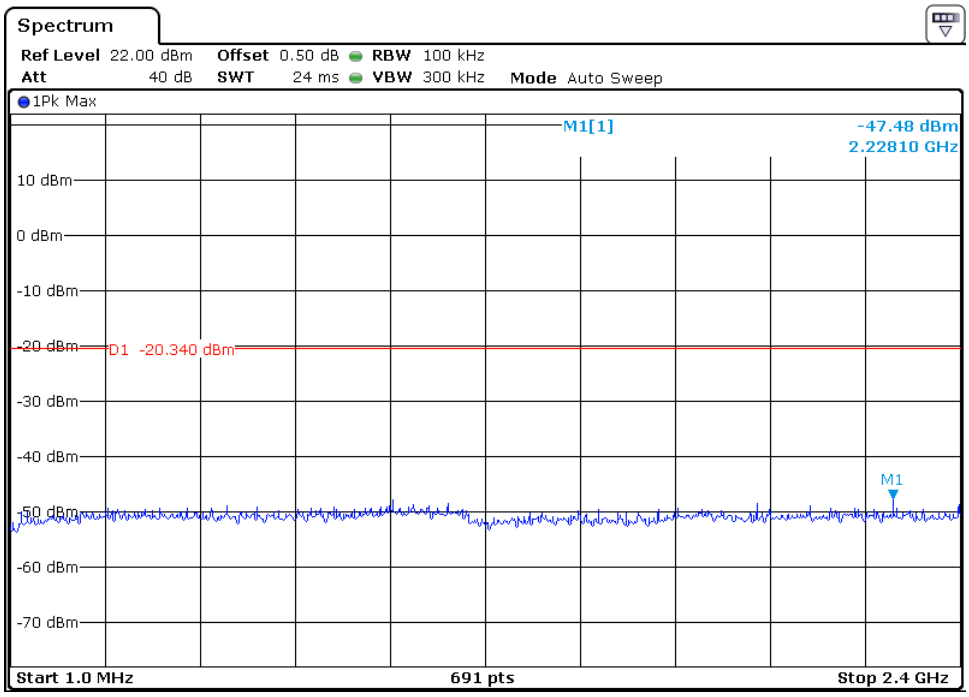
802.11n-HT20
Channel 01 (2412MHz) Reference Level: -2.65dBm

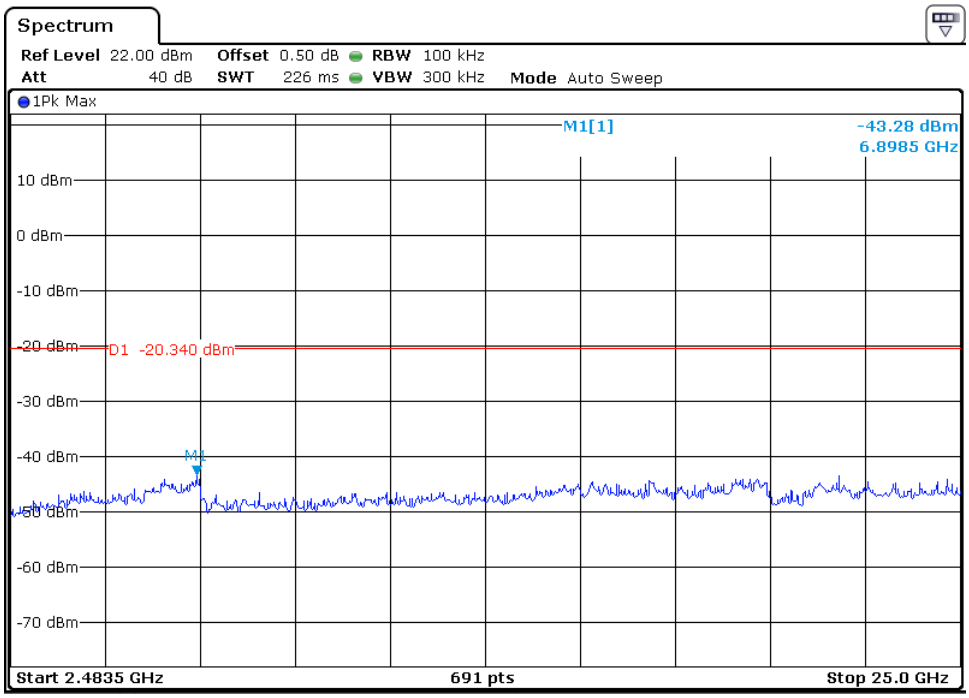




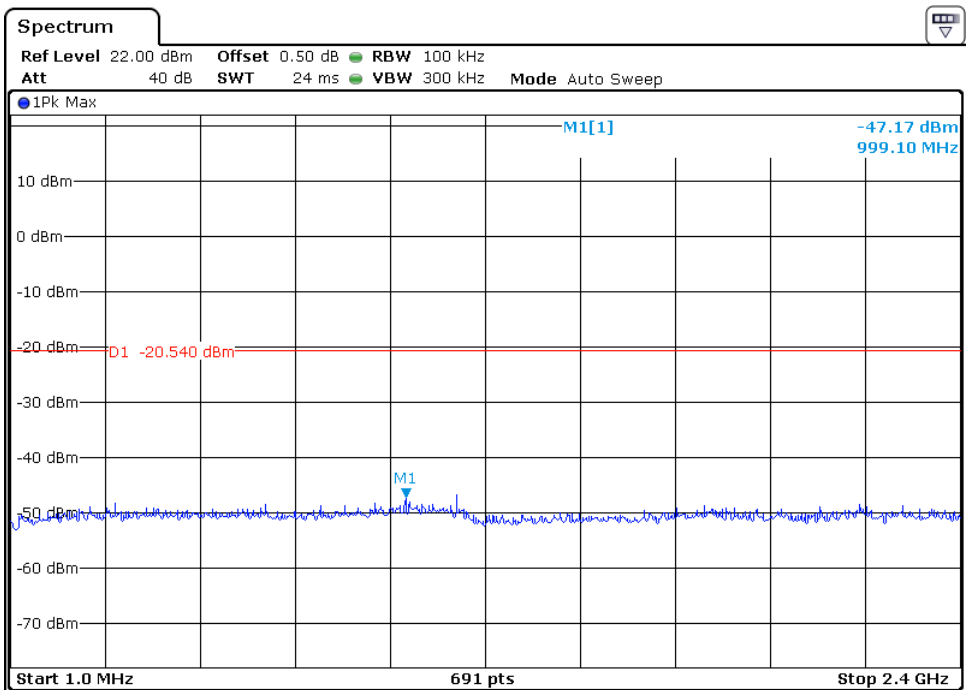

Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 132.7 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -34.36 dB
-6.8600 MHz
M1[1] -2.60 dBm
2.4057310 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
D1
CF 2.4 GHz
691 pts
Span 60.0 MHz

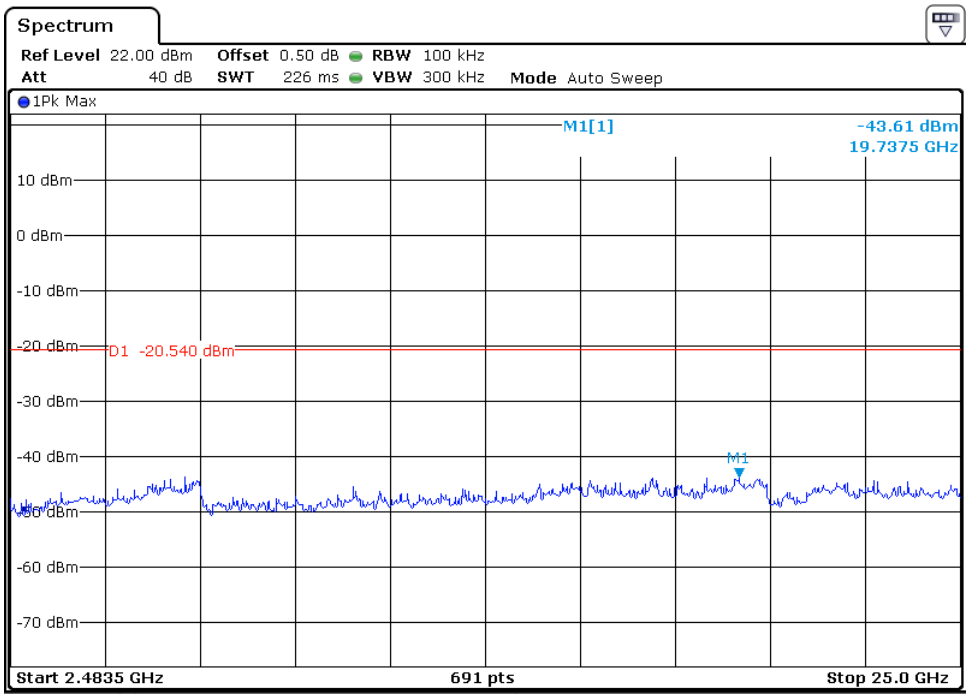
Channel 06 (2437MHz) Reference Level: -0.34dBm

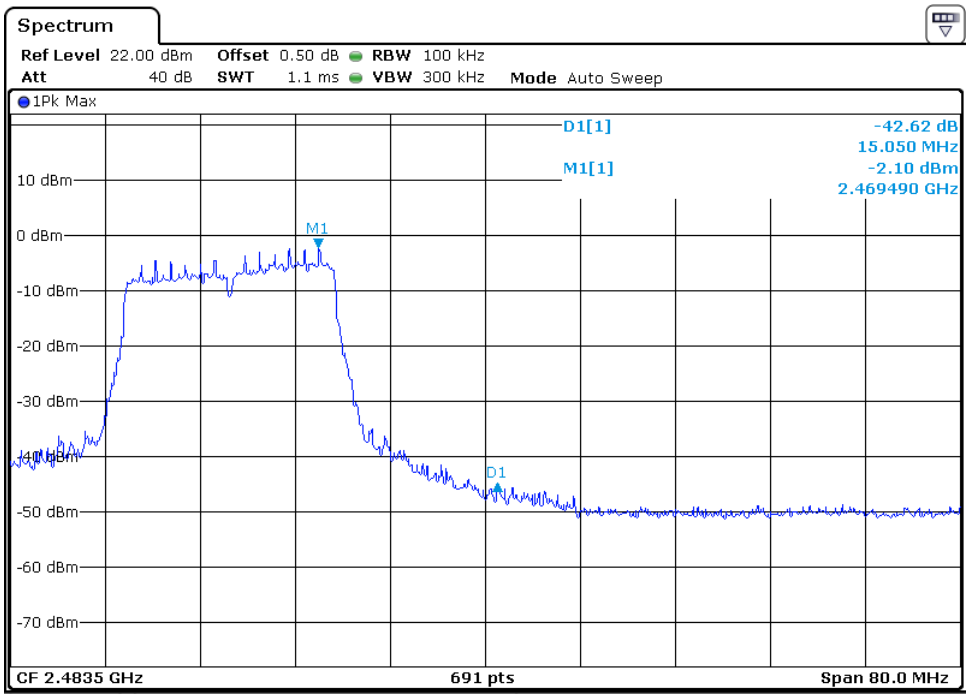




Channel 11 (2462MHz) Reference Level: -0.54dBm






Spectrum
Ref Level 22.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep
1Pk Max
D1[1] -42.62 dB
15.050 MHz
M1[1] -2.10 dBm
2.469490 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
D1
CF 2.4835 GHz
691 pts
Span 80.0 MHz

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L

4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

[×] Not required, since all emissions are more than 20dB below fundamental
[ ] See attached data sheet

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b) (c):

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L

4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD

Example

Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 42 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dBμV/m

Level in mV/m = Common Antilogarithm [(42 dBμV/m)/20] = 125.9 μV/m

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L

4.8 Radiated Spurious Emission

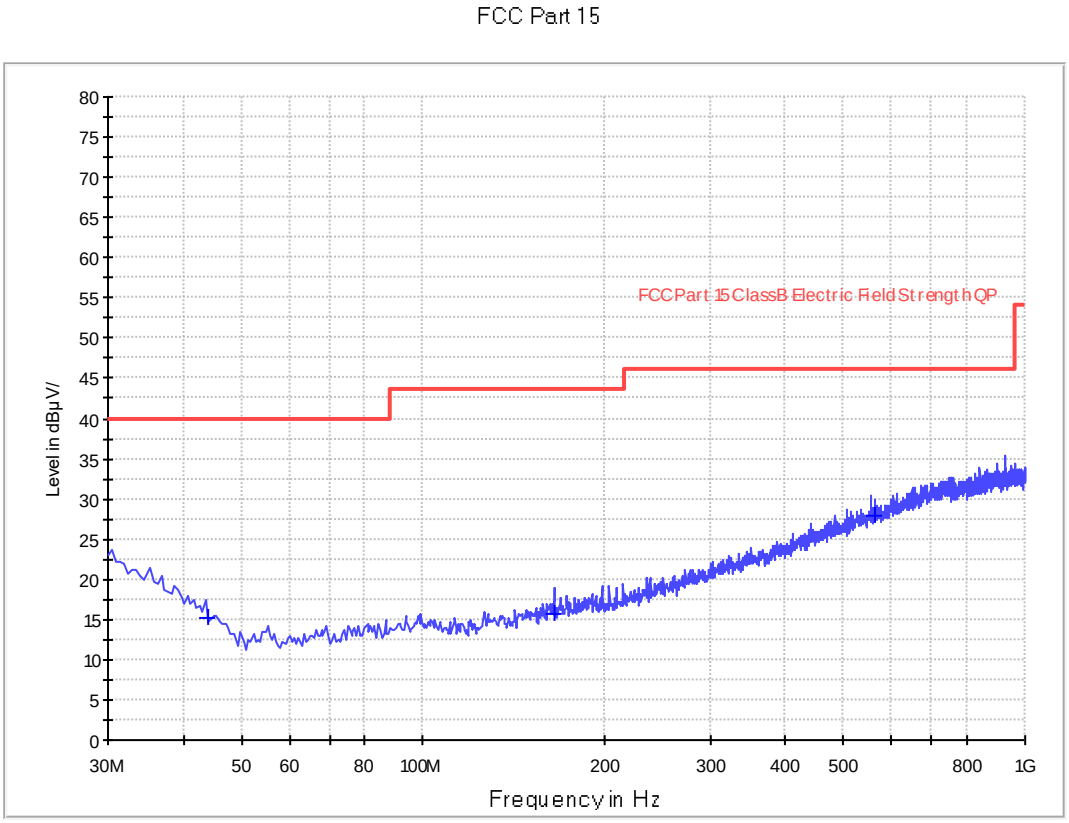
The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit. Only worst-case is reported.

Worst Case Radiated Spurious Emission (SISO ANT1 802.11b-Channel 11)
at 2390.000MHz
is passed by 7.8dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L
Worst Case Operating Mode: Wi-Fi Link

ANT Polarity: Horizontal

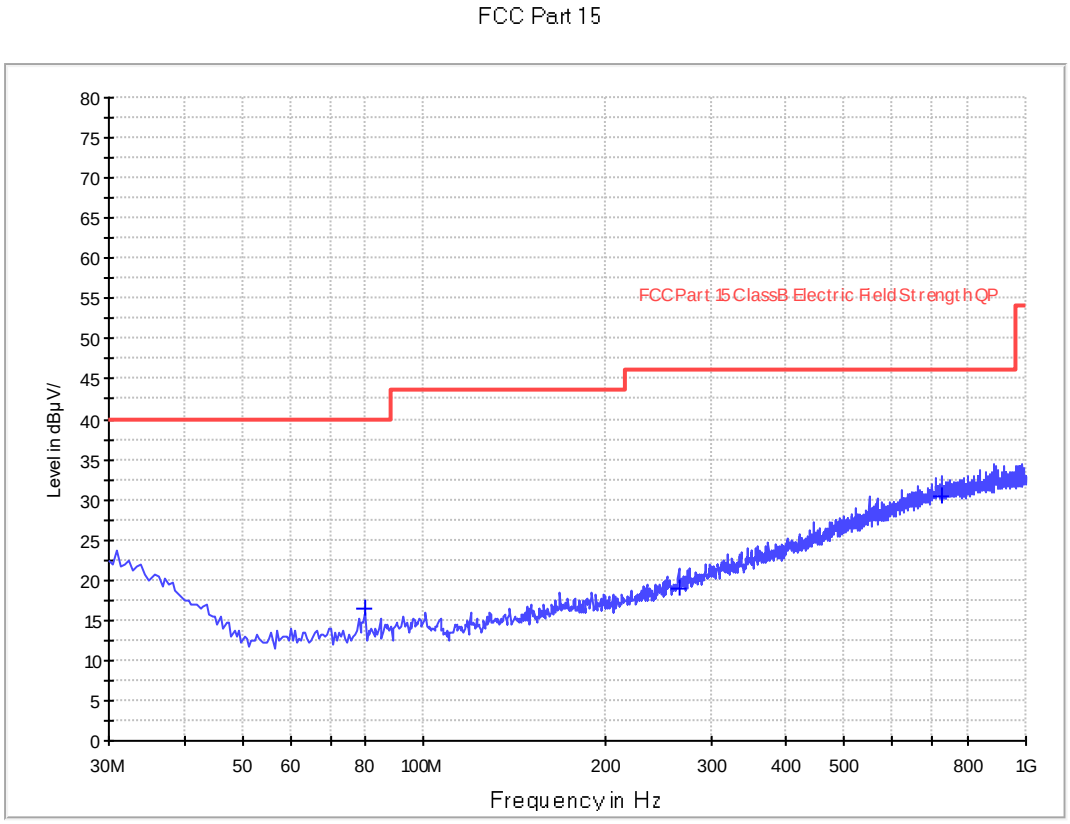


Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
44.000000	15.2	1000.0	120.000	H	11.1	24.8	40.0
165.315000	15.6	1000.0	120.000	H	12.0	27.9	43.5
562.530000	27.8	1000.0	120.000	H	23.6	18.2	46.0

Remark:
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
3. Margin (dB) = Limit Line(dBµV/m) – Level (dBµV/m)

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L
Worst Case Operating Mode: Wi-Fi Link

ANT Polarity: Vertical



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
80.000000	16.5	1000.0	120.000	V	9.1	23.5	40.0
265.225000	19.0	1000.0	120.000	V	15.4	27.0	46.0
726.945000	30.5	1000.0	120.000	V	26.4	15.5	46.0

Remark:
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
3. Margin (dB) = Limit Line(dBµV/m) – Level (dBµV/m)

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L
Worst Case Operating Mode: Transmitting (802.11b-Channel 01)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	52.6	36.8	33.5	49.3	74.0	-24.7
Horizontal	*2390.000	65.5	36.4	29.1	58.2	74.0	-15.8

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	43.3	36.8	33.5	40.0	54.0	-14.0
Horizontal	*2390.000	51.8	36.4	29.1	44.5	54.0	-9.5

NOTES:

1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L
Worst Case Operating Mode: Transmitting (802.11b-Channel 06)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	55.9	36.7	33.4	52.6	74.0	-21.4
Horizontal	*7311.000	53.7	36.6	35.8	52.9	74.0	-21.1

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	49.7	36.7	33.4	46.4	54.0	-7.6
Horizontal	*7311.000	43.9	36.6	35.8	43.1	54.0	-10.9

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L
Worst Case Operating Mode: Transmitting (802.11b-Channel 11)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	56.2	36.8	33.3	52.7	74.0	-21.3
Horizontal	*7386.000	60.4	36.5	29.3	53.2	74.0	-20.8

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	48.4	36.8	33.3	44.9	54.0	-9.1
Horizontal	*7386.000	51.2	36.5	29.3	44.0	54.0	-10.0

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L
Worst Case Operating Mode: Transmitting (802.11g-Channel 01)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	53.1	36.8	33.5	49.8	74.0	-24.2
Horizontal	*2390.000	70.5	36.4	29.1	63.2	74.0	-10.8

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	42.7	36.8	33.5	39.4	54.0	-14.6
Horizontal	*2390.000	52.0	36.4	29.1	44.7	54.0	-9.3

NOTES:

1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L
Worst Case Operating Mode: Transmitting (802.11g-Channel 06)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	51.9	36.7	33.4	48.6	74.0	-25.4
Horizontal	*7311.000	52.7	36.6	35.8	51.9	74.0	-22.1

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	43.4	36.7	33.4	40.1	54.0	-13.9
Horizontal	*7311.000	42.6	36.6	35.8	41.8	54.0	-12.2

NOTES:

1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L
Worst Case Operating Mode: Transmitting (802.11g-Channel 11)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	51.1	36.8	33.3	47.6	74.0	-26.4
Horizontal	*7386.000	59.7	36.5	29.3	52.5	74.0	-21.5

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	43.1	36.8	33.3	39.6	54.0	-14.4
Horizontal	*7386.000	50.2	36.5	29.3	43.0	54.0	-11.0

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L
Worst Case Operating Mode: Transmitting (802.11n20-Channel 01)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	51.8	36.8	33.5	48.5	74.0	-25.5
Horizontal	*2390.000	68.5	36.4	29.1	61.2	74.0	-12.8

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	42.7	36.8	33.5	39.4	54.0	-14.6
Horizontal	*2390.000	51.4	36.4	29.1	44.1	54.0	-9.9

NOTES:

1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L
Worst Case Operating Mode: Transmitting (802.11n20-Channel 06)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	55.0	36.7	33.4	47.3	74.0	-22.3
Horizontal	*7311.000	55.1	36.6	35.8	52.1	74.0	-19.7

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	42.8	36.7	33.4	39.0	54.0	-14.5
Horizontal	*7311.000	42.9	36.6	35.8	42.3	54.0	-11.9

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020 Model: CP3504L
Worst Case Operating Mode: Transmitting (802.11n20-Channel 11)

Radiated Emissions (above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	55.3	36.8	33.3	49.1	74.0	-22.2
Horizontal	*7386.000	62.0	36.5	29.3	52.2	74.0	-19.2

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	42.5	36.8	33.3	40.1	54.0	-15.0
Horizontal	*7386.000	50.1	36.5	29.3	43.7	54.0	-11.1

NOTES:

1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 20 August 2020
Model: CP3504L

4.9 Conducted Emission

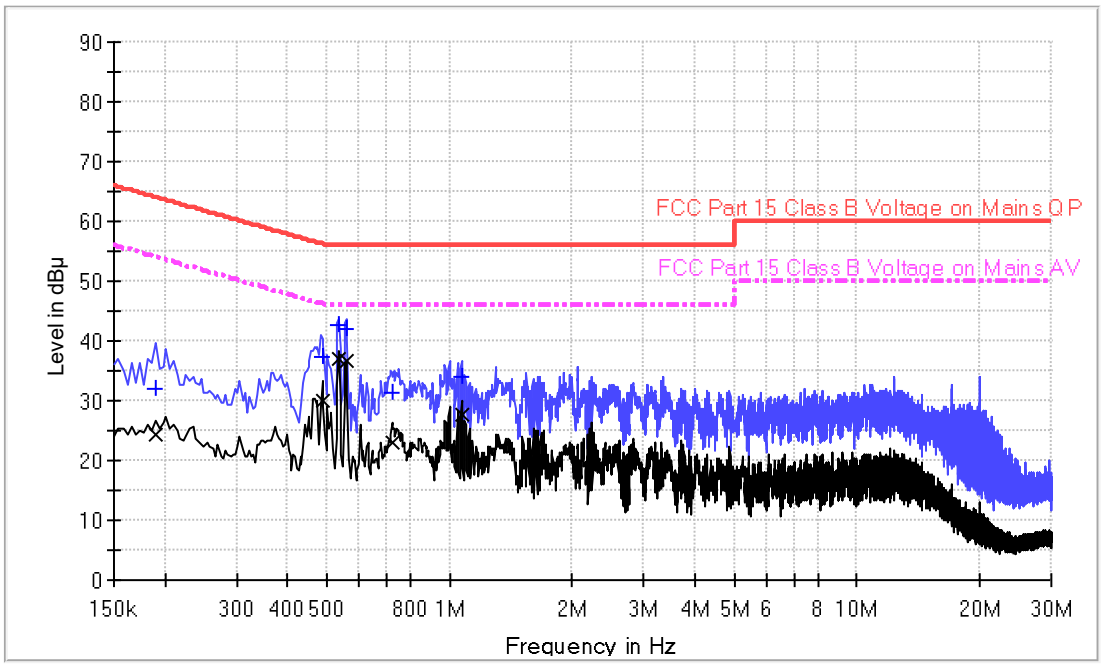
Worst Case Conducted Emission
at 0.510MHz
is passed by 13.8dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: conducted photos.pdf.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 20 August 2020
Model: CP3504L
Worst Case Operating Mode: Wi-Fi Link
Phase: Live

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.190500	31.9	9.000	L1	9.7	32.1	64.0
0.486000	37.3	9.000	L1	9.7	18.9	56.2
0.534000	42.6	9.000	L1	9.7	13.4	56.0
0.558000	41.9	9.000	L1	9.7	14.1	56.0
0.722000	31.3	9.000	L1	9.7	24.7	56.0
1.070000	34.1	9.000	L1	9.7	21.9	56.0

Limit and Margin AV

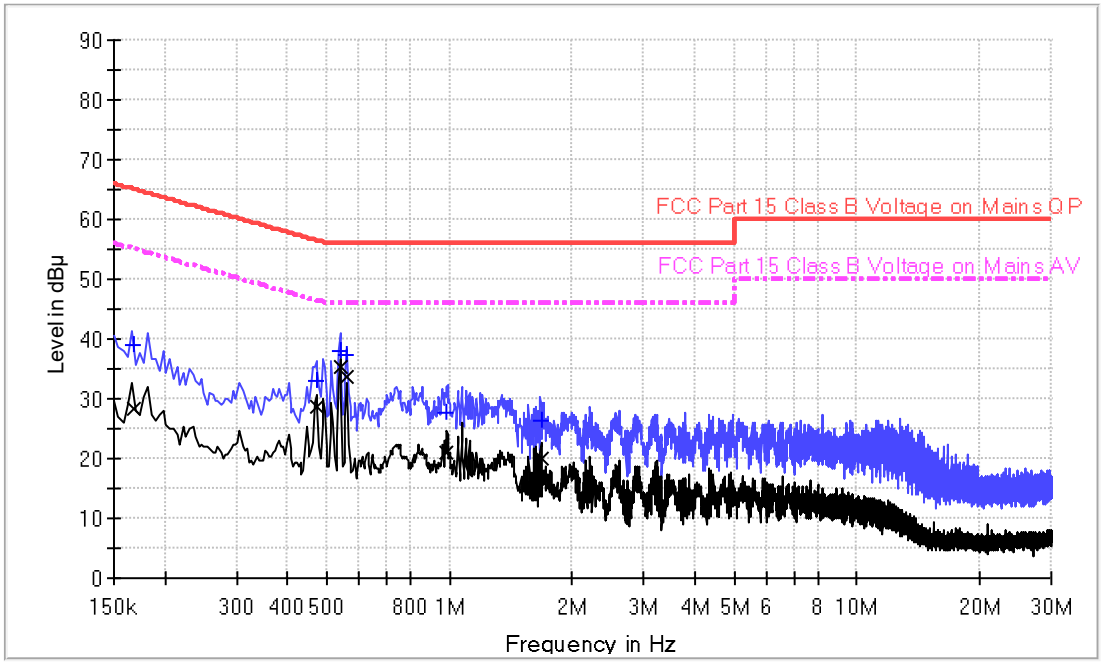
Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.190500	24.4	9.000	L1	9.7	29.6	54.0
0.486000	30.1	9.000	L1	9.7	16.1	46.2
0.534000	37.1	9.000	L1	9.7	8.9	46.0
0.558000	36.6	9.000	L1	9.7	9.4	46.0
0.722000	23.1	9.000	L1	9.7	22.9	46.0
1.070000	27.8	9.000	L1	9.7	18.2	46.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 20 August 2020
Model: CP3504L
Worst Case Operating Mode: Wi-Fi Link
Phase: Neutral

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.168000	39.0	9.000	N	9.7	26.1	65.1
0.470000	32.9	9.000	N	9.7	23.6	56.5
0.538000	38.0	9.000	N	9.7	18.0	56.0
0.558000	37.5	9.000	N	9.7	18.5	56.0
0.986000	27.8	9.000	N	9.7	28.2	56.0
1.678000	26.4	9.000	N	9.7	29.6	56.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.168000	28.3	9.000	N	9.7	26.8	55.1
0.470000	28.7	9.000	N	9.7	17.8	46.5
0.538000	35.3	9.000	N	9.7	10.7	46.0
0.558000	33.6	9.000	N	9.7	12.4	46.0
0.986000	21.1	9.000	N	9.7	24.9	46.0
1.678000	19.9	9.000	N	9.7	26.1	46.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 25 August 2020
Model: CP3504L

4.10 Radiated Emissions from Digital Section of Transceiver, FCC Ref: 15.109

[ ] Not required - No digital part

[ ] Test results are attached

[x] Included in the separated report.

Applicant: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Date of Test: 21 August 2020
Model: CP3504L

4.11 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

	See attached spectrum analyzer chart (s) for Transmitter timing
	See Transmitter timing diagram provided by manufacturer
x	Not applicable, duty cycle was not used.

5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf & internal photos.pdf.

6.0 Product Labeling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf.

7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

9.0 Confidentiality Request

For electronic filing, the confidentiality request of the tested EUT is saved with filename: request.pdf.

10.0 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF.*

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

11.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ182-02	RF Power Meter	Anritsu	ML2496A	1302005	2020-05-27	2021-05-27
SZ182-02-01	Power Sensor	Anritsu	MA2411B	1207429	2020-05-27	2021-05-27
SZ061-12	Biconilog Antenna	ETS	3142E	00166158	2018-09-14	2020-09-14
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2019-05-24	2021-05-24
SZ061-08	Horn Antenna	ETS	3115	00092346	2019-09-07	2021-09-07
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	2019-08-13	2021-08-13
SZ056-03	Spectrum Analyzer	R&S	FSP30	101148	2020-05-27	2021-05-27
SZ185-01	EMI Receiver	R & S	ESCI	100547	2019-12-24	2020-12-24
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	2020-05-27	2021-05-27
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2018-12-15	2021-12-15
SZ062-02	RF Cable	RADIALL	RG 213U	--	2020-06-12	2020-12-12
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	2020-08-10	2021-02-10
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	2020-08-10	2021-02-10
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	2020-05-27	2021-05-27
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	2019-10-29	2020-10-29
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	2020-05-27	2021-05-27
SZ188-03	Shielding Room	ETS	RFD-100	4100	2020-01-07	2023-01-07
SZ062-16	RF Cable	HUBER+SUHNER	CBL2-BN-1m	110127-2231000	2019-10-30	2020-10-30

********** End of Report**********